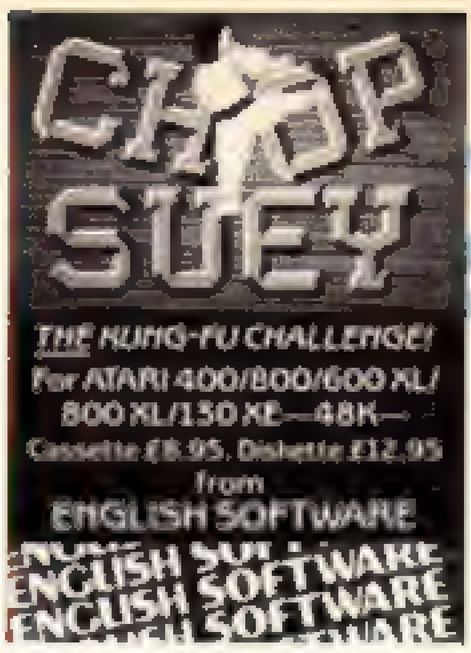
HOME COMPUTING WEEKLY
AN ARGUS SPECIALIST PUBLICATION
August 20-26 1985 No. 126 50p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HCW FIRST

Will it stop the pirates? p.7

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The Young Ones here they come!

The Young Ones computer game is on the way. Orpheus has beaten off competition from practically every major software house to secure the rights to the BBC's cult comedy show.

Orpheus will be previewing The Young Ones at PCW and the game, described as "an animated adventure with arcade elements" is scheduled for release in October, initially for the C64 and Spectrum with Amstrad and MSX versions to follow.

Managing Director of Orpheus, Paul Kaufman told HCW, "As far as I'm concerned The Young Ones will be the only game worth buying this Christmas. We've spent eight months developing the game and fans of the series will not be disappointed. This is the game everyone has been waiting for."

The game has been developed in collaboration with Young Ones scriptwriting team Rik Mayal, Ben Elton and Lisa Mayer and allows the player to take on the character of either Rick, Neil, Viv or Mike while the computer plays the other three roles.

An Orpheus spokesman said, "For the first time in a computer game the characters will be self-motivated. They will be able to speak with each other and interact. Each of the four characters will speak using speech bubbles for text and we've tried to keep them as much in character as possible. They will react to things just as Rick, Viv, Neil and Rick would."

The spokesman added, "This game breaks new territory in every respect. It will never be the same twice no matter how many times you play it." The basic task confronting the characters has yet to be revealed and Orpheus and The Young Ones scriptwriting team are now putting the final touches to the programme so that the mannerisms of the computer characters will be authentic.

The Young Ones — taped at last!

Maxwell out — Dixons in

Sinclair has signed a contract worth £10m to supply Dixons the high street retailers with 160,000 home computers and flat screen televisions.

The deal was struck soon after Robert Maxwell withdrew his offer to takeover Sinclair with a £12m cash injection.

A spokesman for Sinclair commenting on the new arrangement with Dixons said, "I think it's a shot in the arm for the whole industry. Dixons are a bright retailer and they are certainly not going to part with that sort of money unless they are confident that the products will sell. It's a vote of confidence."

The releasing of Sinclairs' stockpile of Spectrums into the marketplace may mean discounts for the consumer but the Sinclair spokesman added, "We expect the prices of Spectrums to remain consistent across the market but there may well be discounts in the area of "bundles" of which the Spectrum is a part."

Sir Clive Sinclair

Valiant's Turtle upturned p.16

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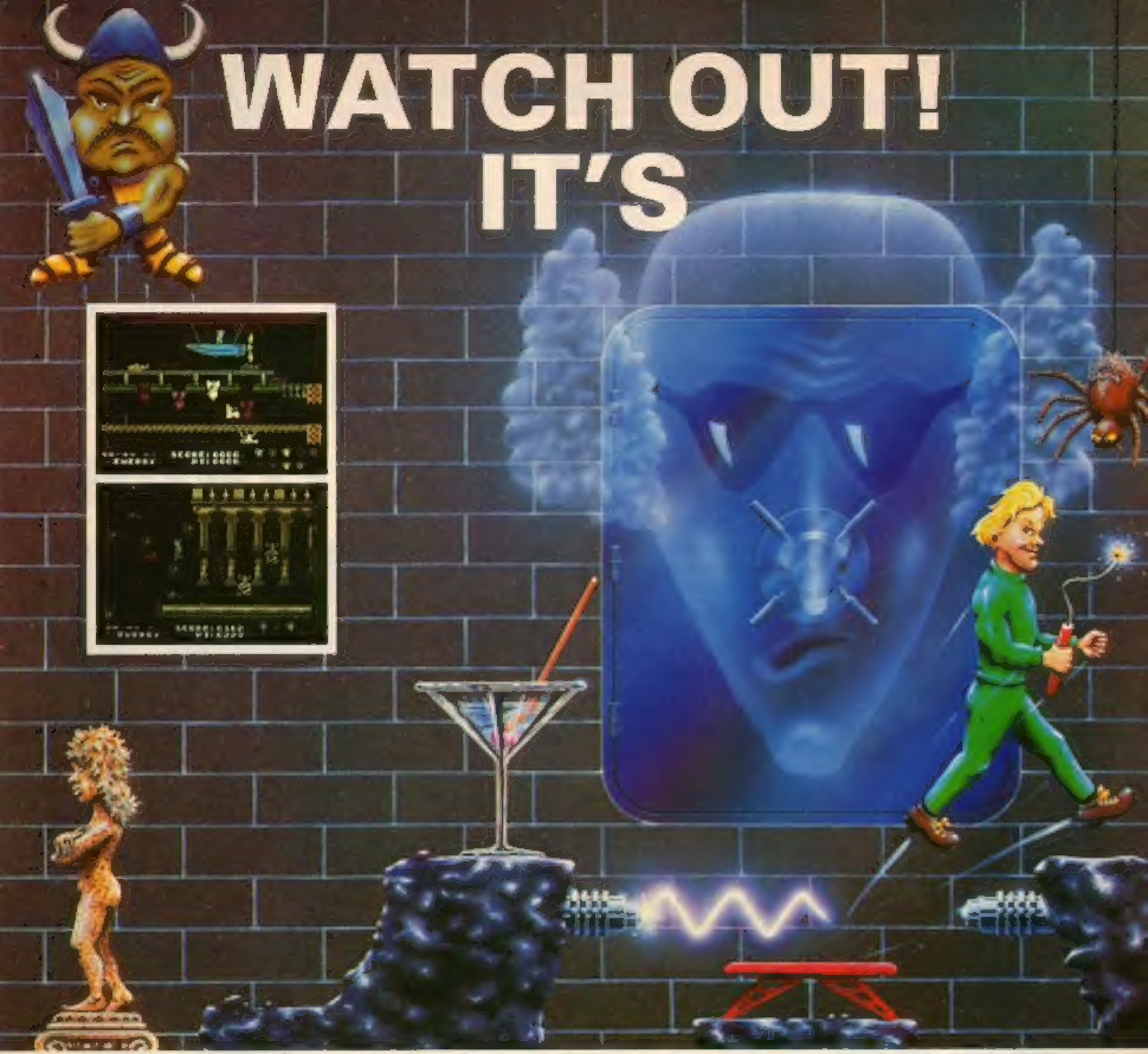
Games for Amstrad, C64 Spectrum



DYNAMITE DAN

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Popular Computing Weekly.

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HOME COMPUTING WEEKLY

August 20-August 26, 1985
No. 126

HENRY'S HOUSE
....and friends!!
VOLUMES ONE AND TWO
C64 COMMODORE C128
COMING SOON!

Soapbox

For the time being at least, it looks as if Sir Clive Sinclair is leading a charmed life. Robert Maxwell may have pulled out of his £12m rescue bid (and I wonder why he did that?), but the contract that Sinclair Research has signed with Dixons seems to have pulled its fat out of the fire.

However, though Sinclair's short term cash flow problem seems to be solved, there must still be some uncertainty about the company's long term future. Many of its recent problems were the result of poor management, not just the state of the industry. Whilst Sinclair Research had a £30m stockpile of machines, Timex (one of their main debtors) was supplying a company called Zeta with Spectrums for overseas sale, and Zeta claimed to be able to sell them as fast as Timex could supply them.

Still, with new chief executive, Bill Jeffrey, in control of management, the 128k Spectrum looking set for the Christmas market, and the recent breakthrough in Wafer Scale Integration to exploit, the future looks (potentially) rosy for Sinclair Research. I'd like to see Sir Clive and co. survive, but if they don't get their management act together, then another self-induced crisis is not out of the question.

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Argus Specialist Publications Ltd.
No. 1 Golden Square, London W1R 3AB. 01-437 0626

Home Computing Weekly is published on Tuesdays. Subscriptions and back issues: Infonet Ltd. 10-13 Times House, 179 Marlowes, Hemel Hempstead, Herts HP1 1BB. 0442 48432. Trade distribution: Argus Press Sales and Distribution Ltd. 12-14 Paul Street, London EC2A 4JS. 01-247 8233. Printed by Alabaster Passmore & Sons, Ltd. of London and Maidstone, Kent. Design and origination: Argus Design Ltd. Circus House, 26 Little Portland Street, London W1N 5AF.

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HIGH PERFORMANCE PROGRAMS

Ring of Confidence

Winner of the spot the HCW Assistant Editor Competition in HCW 123 was J. Roberts of Carburton Street, London W1 who ringed the head of yours truly in the school photo of the massed ranks of the computer press.

The photo, taken at Hewson Consultants celebration of five years in business at Didcot Railway Centre produced some intriguing speculations about my identity but it was Mr Roberts who finally applied the winning circle and wins a selection of software for his Spectrum.

Workstation winner

Lisa Hadcock of Urmston, Manchester will soon be the proud possessor of a Hago Personal workstation after winning our competition in HCW 122. The workstation which provides shelfspace for VDU, keyboard and accessories, is adjustable for any system and worth over £90.

Dave, HCW's ergonomically designed editor reckoned that the biggest advantage of the workstation was that its ergonomic design reduces fatigue.

Lisa's was the first entry pulled out of the hat to agree with Dave's ordering of the six advantages E,B,D,C,A,F.

Surprize, surprize!

The Ashkeron Adventure of the Month continues — and the Prize of £25 for the highest scorer still stands.

Mirrorsoft's Ashkeron, the game with walk-through graphics, is now also available for Amstrad users.

Details of the lucky winner (just imagine what you could do with £25 — that's a years supply of HCW's!) will be announced in a future issue of HCW, incentive enough in itself.

Bryan Ralph — the secret is out

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Packing it in

Working on the principle that most people who buy a joystick will need to buy an interface, Vulcan Electronics have brought out customised product packs allowing a variety of joystick/interface combinations.

According to Vulcan, the packs contain everything needed to connect the joystick to a particular user's computer. The Joystick Pack is available for the Spectrum, BBC, the C16 and Plus 4. Prices start at £10.95 for the C16.

Vulcan Electronics, 200 Brent St, Hendon, London NW4 1BH.

Vulcan's Joystick Packs

Cumana have just introduced a Super Value Disk Drive Starter Pack especially for first time disc drive buyers.

Available for BBC, Electron, Spectrum or Dragon users, the pack consists of a single disc drive with disc interface, user manual and accessories.

The package should not only up-grade your system but also increase storage capacity and prices start at £149.

Cumana, Pines Trading Est, Broad St, Guildford, Surrey, GU3 3BH.

Cumana's Super Value Disc Drive Pack

At the show

Look out for the Mirrorsoft blimp flying high over Olympia during the PCW show. Mirrorsoft will be unveiling a host of new products at the show and one of them, the Fleet Street Editor, will be of special interest to aspiring journalists.

The Editor allows you to do everything you need to do to produce a mock-up newspaper page on screen. Not only does it allow you to pull files from Wordwise and View but it also has a page make-up system, wordprocessing and generated graphics so you can brighten up your page with illustrations or even your own cartoon strip. The Fleet Street Editor will be available initially for the BBC and costs £39.95.

Mirrorsoft will have a Mr Man, (Mr Silly) wandering around the hall to publicise the release of a new three game pack of Mr Men games. One of them is called The Invisible Mr Men in which all the Mr Men disappear except two who have to set out to find the rest. The three pack game will cost £9.95 and will be for the BBC, Spectrum and Amstrad.

An almost complete version of Strike Force Harrier will be on demonstration at the Mirrorsoft stand. The game is an aerial combat simulation involving the destruction of your adversaries HQ. The game will be available in December for the BBC and will cost £9.95.

Mirrorsoft have secured the rights to The Giddy Game Show, A Yorkshire TV programme that is shortly to be networked nationwide. Aimed at the under fives and their parents the series concentrates on identifying and learning one letter of the alphabet at a time and the software program will follow the same format. On the horizon from Mirrorsoft is Dynamite Dan II and a tie in with "A Big Film" that won't be released until the spring.

All mapped-out

MAP IT have come up with a clever little number called Map Maker which — would you believe — helps adventure players with their drawing.

As an aid to both writing and playing adventure games Map Maker does away with paper maps and using the special pen and plastic mat provided you can write and then simply rub out with a damp cloth when finished.

So if you're tired of messy maps maybe this little invention, priced at £4.48, might help.

MAP IT, 166 Robert St, Ynysybwl, Mid Glamorgan, CR37 3EA.

LENSLOK

Locked out

Regular readers of HCW will be aware that there have been real changes in the law which makes the copying of software illegal. There have been fewer changes to make the process of copying more difficult!

Lenslok aims to change all that and looks set to give the pirates, whether amateur or professional, a hard time.

Put at its most basic, Lenslok is a method of protecting a piece of software from audio copying. It will try to prevent a buyer making a copy which is then passed to another computer owner. What it won't do is prevent the owner of the program making a backup copy, in fact he or she can make as many backups as they like but they will only be able to use one at a time.

So how can such a simple idea work in practice? The principle is that the software cannot be used without the special "optical dongle". You will have to type a code into the machine after loading which will make the program work and you can only do this with the lens in your hand.

The product is being marketed by ASAP Developments, a subsidiary company in the huge J Rothschild Holdings plc. "It was developed by John Frost, an electronics consultant and freelance inventor, who brought it to us for marketing," revealed Mike Smith, managing director of ASAP. "We specialise in taking an idea from the invention to the market place and that is exactly the situation with the product."

In the case of a copy protection the market is of course the software houses whose products are being protected. ASAP started to show software houses the development versions of the product a couple of months ago and have had a mixed reaction. Some were very enthusiastic and others not quite so keen.

Some of the big names in the business have got behind the idea and there are a few locked products in the pipeline. The product is certainly cheap and can be simply produced in large numbers yet at the same time it but there is hope for a low cost as Tim Langdell, chairman of GOSH, suggests "My only reservation would be the cost but if the system is taken up generally then that cost would be will be very difficult to copy. The price of the product is a concern for all those involved marginal. If we (Softek) decided to incorporate the system we would not pass on the cost to the consumer, we would regard it as our own cost to safeguard our software."

The first product to feature the new system will be Firebird's Elite on the Spectrum which is due for release during September. Firebird are really behind the lens as Herbert Wright explained "We are amazingly pleased to be the first publishing house to use Lenslok. We have been thinking for some time of taking the initiative against piracy and Lenslok breaks out of the syndrome of constantly refining disc and cassette protection systems."

"Such a formidable weapon warrants a massive prestige game to launch it — Spectrum Elite is as big a launch as you can get!" Elite will cost £14.95 but Herbert says that Lenslok plays no part in this price, it would have been the same price without Lenslok, he claims.

ASAP claim that they can produce enough lenses for the Christmas software market but it remains to be seen if they can persuade a large number of software houses to take up the system.

With a potential market of 20 million a year it is perfectly possible that Mike's dream will come true. "I have this picture in my mind of a computer owner with a string of lenses similar to piles of credit cards that some businessmen collect."

ASAP Developments, 65 Holborn Viaduct, London.

LENSLOK
LENSLOK
LENSLOK
LENSLOK

How it works

The Lenslok product is a two part system, the first part being a plastic lens which is enclosed with each "locked" cassette when you buy it. The second part is a machine code routine which is embedded in the program itself and which will give you a code to type in.

When a Lenslocked code appears you have to place the lens against the screen and then read the code from the TV or monitor. We have only seen a test routine but the procedure went something like this.

First the screen needs to be set for size. There is a bar at the centre which can be lengthened or contracted until it is approximately as long as the lens holder in your hand.

Then a test message appears which allows you to place the lens in position and get a read out. The only difficulty that can occur at this stage is that the lens is placed out of position but if you read the test message — usually the letters "OK" — then you are unlikely to have problems.

Finally, the real coded message is displayed which you have 10 seconds to read after which you must try another. If you type the message in at the keyboard during that period then the game or utility will proceed as normal.

That's all there is to it. The game won't work without the code and you can't read the code without the lens, hence the protection!

For those who like a few more details the lens is really a series of prisms which can reorder the dots that are used to make up a printed character. So when the coded pattern appears on the screen the prisms move the dots into the correct order so that you can read the letters concerned.

The code is likely to have at least two letters and they can be both upper or lower case characters plus all the digits. The code is changed at each presentation and there is therefore no chance of it being remembered or written down.

Each Lenslocked product will have its own lens which will not work for another product, whether from the same company or not. Jim Dewar, ASAP's technical director, has done his sums and reckons that there are over seven billion possible combinations which should cope with most software for a few years to come.

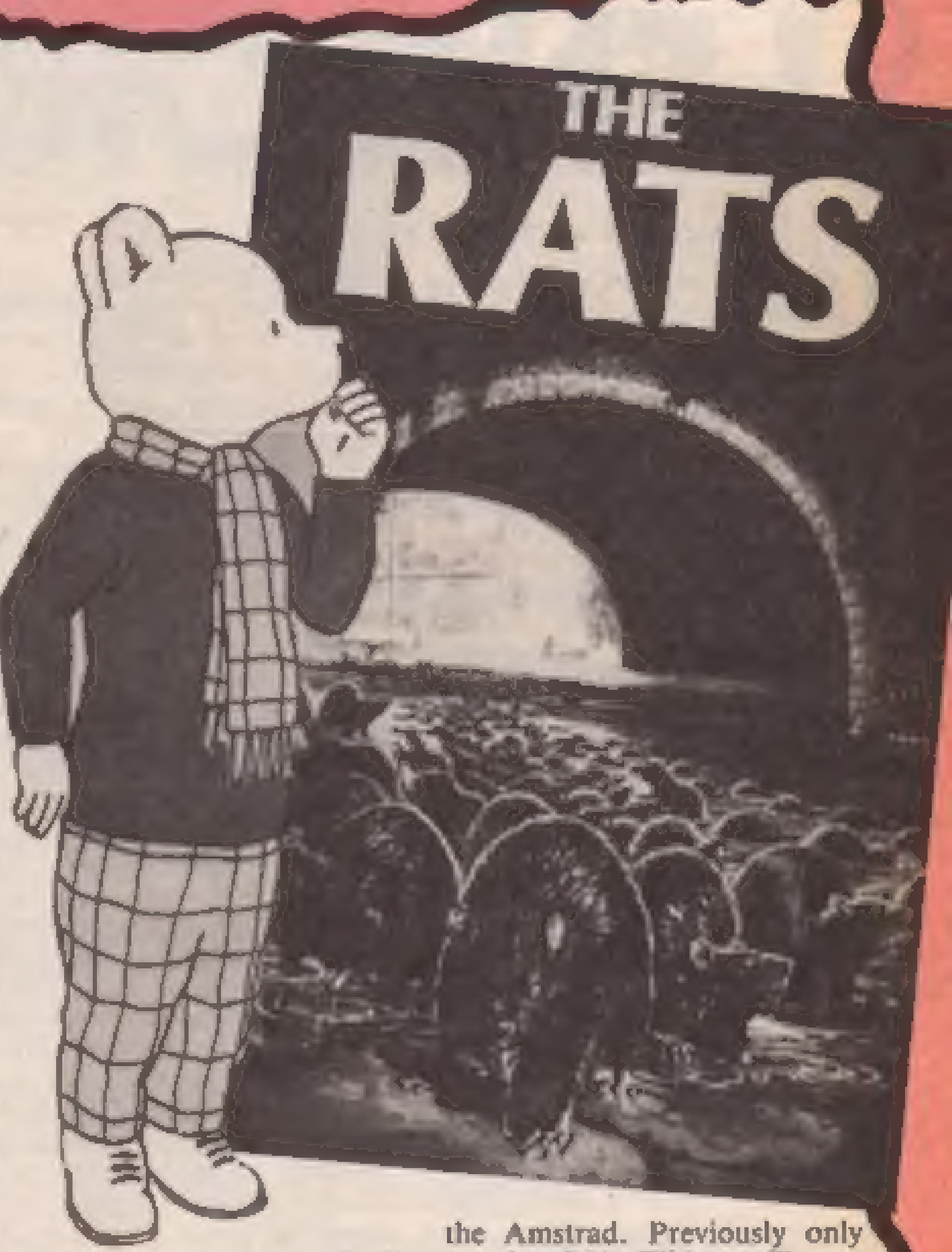
The only way into the system is through the encryption code which actually produces the pattern. This is the obvious place for the pirates to start their cracking activities but they aren't going to find it easy.

Herbert Wright, Firebird's Mr Gold, admits that the system "isn't 100% secure. There is only one way to ensure full security and that is for each purchaser of a product to be issued with an armed security guard who goes home with the buyer and makes sure that the product isn't copied." It looks as though Lenslok is a large step in the right direction, for Firebird at least.

RELEASES

It might be wet outside but we're home and dry with the hottest releases this week . . .

Shorts



If by any chance you ever considered rats to be cuddly you will be sadly disillusioned by the forthcoming rodent ridden game from Hodder and Stoughton Software. Based on James Herbert's novel of the same name, The Rats pits you against hordes of Roland's nasty cousins who are trying to take over London. In a series of 16 adventures in which you take a number of roles your objective is to track down and eradicate the rats who are swarming through the metropolis. The Rats will be available in September for the C64 and Spectrum price £7.95.

Rupert of course has never menaced anyone and at 65 years old the venerable bear is making his software debut in Quicksilva's Rupert and the Toymaker's Party. It is the first of a series of Rupert releases proving that it's never too late for computer game fame. Rupert and the Toymakers Party for Spectrum and C64 will be in the shops at the end of August.

Amstrad adventurers will be pleased to know that Master of the Lamps is now available from Activision. You have to be a master of the flying carpet to complete this game and use your tasselled shuttle craft to recover a stolen crown. There are no less than 20 levels to negotiate on your turbo charged Axminster and a trio of geniis to set you tasks. Price £9.99.

Atlantis Software have two new releases out now. Cops 'n' Robbers is all about, you guessed it, Cops 'n' Robbers. Light Fingers Lonegan is shovelling gems into his swag bag but the police are on his trail. Fingers has to avoid the boys in blue and scarper for his getaway car. For the Commodore and Vic 20, Cops 'n' Robbers retails at £2.99.

Space Escort which is for the VIC 20, price £1.99 puts you in the role of protector fending off waves of alien attackers who are out to destroy your fleet of space-liners. Don't those aliens ever take a day off?

If you happened to miss Halleys Comet on its last circuit 76 years ago, Eclipse have a program that will make sure you spot it this time around. At £6.95 for the Spectrum, Halleys Comet II is devoted entirely to comet matters and will be a must for astronomy buffs. Eclipse are also releasing Astrolabe and Chemical formulae for the Spectrum priced £6.95 and £9.95 respectively and more on whats happening up there in the firmament with Stars and Planets on BBC B 5¼ inch disc priced £7.95.

Imagine are following up their World Series Baseball game with World Series Basketball for the Spectrum. Available at the end of August, Basketball will be for one or two players using joystick or keyboard and will cost £7.95. An Amstrad version (£8.95) will be available at a later date.

Shards are spreading the rumour that education can be fun with their multiprogramme discs for the BBC entitled Fun Academy. The two disc pack, which includes 22 educational games for ages 6-16 costs £14.95, is available now.

Frac Attac, Hungry Radish, Hangman, Code Breaker, Bridge of Words, Monster Maths are included to name but a few. Orpheus has announced that Elidon is to be released on the Amstrad. Previously only on the C64, Elidon will cost £8.95. Another best seller converted into Amstradese is Everyones a Wally from Microgen which is available now priced £9.95.

Finally Alligata have announced their releases for September, Blagger goes to Hollywood (C64 and Spectrum £7.95). Shoot Em Up, a spoof of every shoot 'em up game ever made will be available for £7.95 with C64 and Atari versions back to back on one disc.

A game provisionally titled Who Dares Wins is a peril fraught mission into enemy territory to rescue hostages. It will be for the C64 and retail at £7.95. Doppleganger, a game for split personalities as you can have two of yourself roaming around the screen will be for the Amstrad and costs £7.95.

Further ahead in October, Alligata will release Quiz Quest for the Amstrad, Spectrum and BBC B all £4.99. Featuring hundreds of questions on general knowledge, Alligata reckon it could be the computer answer to Trivial Pursuits.

The Spectrum on the Commodore

The traditionally Commodore Audiogenic are not only dabbling in different machines since they've joined forces with addictive arcaders Icon, but they're also doing a little dabbling into the art world.

Paint-Box for the C64 and C16 is a colourful hi-res graphics creator — joystick or keyboard control — with paintbrush options and full palette of 16 colours. A 'duckshoot' menu provides advanced commands for both freehand and technical drawing and two pictures can be stored in memory simultaneously. Sounds like good news for would-be Picassos — and costs £9.95.

Kaktus and 3-D Glooper are their other names to play with on the C16. Kaktus is a flower with an insect problem and guess who has to control the little mites (well blast them out of existence really). Moving from sandy to urban desert, 3-D Glooper lands you in a depressing cityscape trying to avoid being Glooped by the dreaded Gloopers (I don't know why but traffic wardens spring to mind). Both of these cassettes are expected to cost £4.95.

Other brief news — Graham Gooch is now knocking them for six on disc, for the C64 at £11.95 and of course Audiogenic will be at the PCW show with new conversions for the C128.

Old haunts revisited

For all your Beach-Head fanatics, U.S. Gold have released Beach-Head II to combat your cravings.

As in the original, the strategy is complex and realism added to with the help of voice-synthesis. The scenario is somewhat different though — your allied forces are still tackling a particularly evil dictator but he's now lost his fortress and is living rough in a tropical forest with his prisoners of war. It's up to your strategic genius to free the prisoners and capture the megalomaniacal swine. Beach-Head II is for the C64 and is on disc, £14.95 and cassette, £9.95. Beach Head, the naval battle and land forces game, is now also available for the Electron.

Their other new title — will they ever stop? — is definitely of a less physical nature. Spirits abound in Harry the Ghostchaser as you explore the chambers of Fairport Manor. It's a familiar matter of collecting keys to tackle the little spectres which might sound hauntingly like something you've done before but the graphics are detailed and there are 16 screens for you to prowl around. Harry the Ghostchaser is for the C64 and Atari and priced the same as Beach Head II.

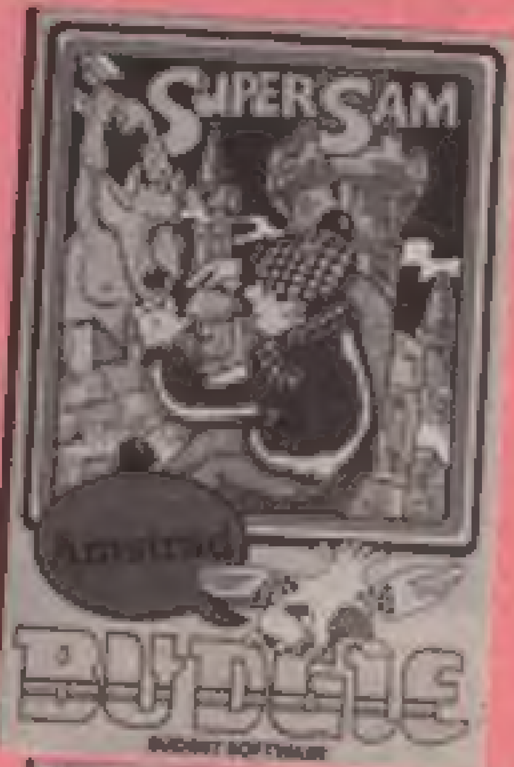
Birds of a feather . . .

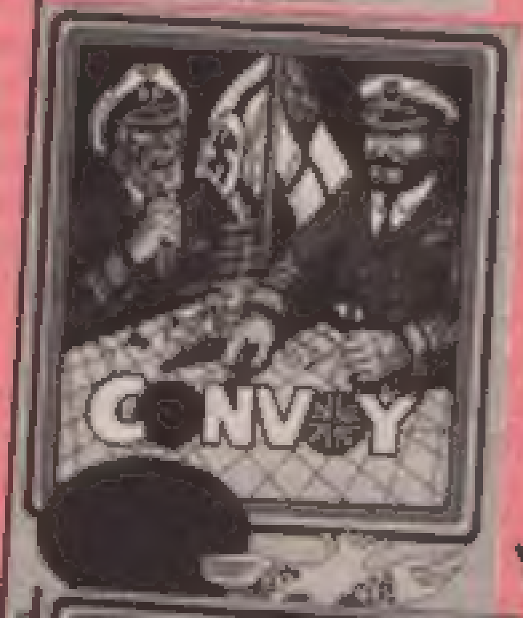
Budgie has absolutely nothing to do with the re-run of the Adam Faith classic — it is in fact a new name in budget software.

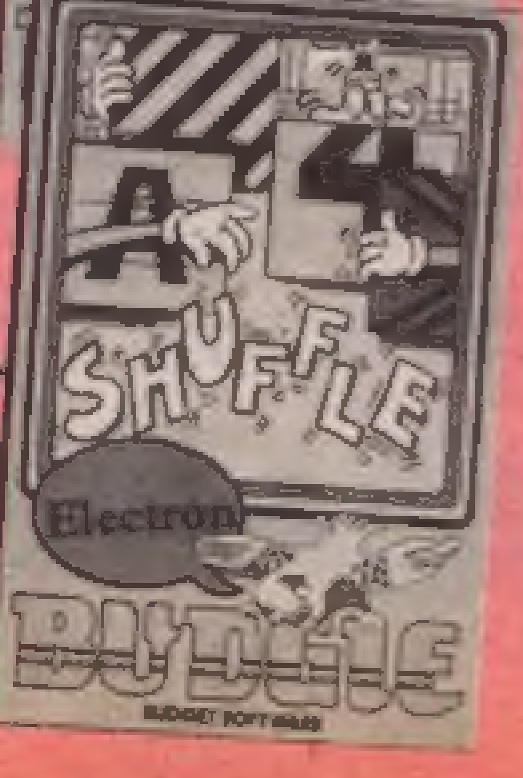
Their initial launch consists of seven titles for a variety of machines, all priced at £2.99. The Spectrum games are Super Sam (also on Amstrad) and Convoy. Super Sam's task is to build a cage made from 18 hidden sections in which to catch the elusive and decidedly green, Boris. Convoy, as you might have guessed, is a 2nd World War strategy game, reminiscent of battleships — how times change! As Commander in Chief of a fleet of warships you have to make sure supplies to your own country get through by blockading the opposition — you ist either German or jolly Brit.

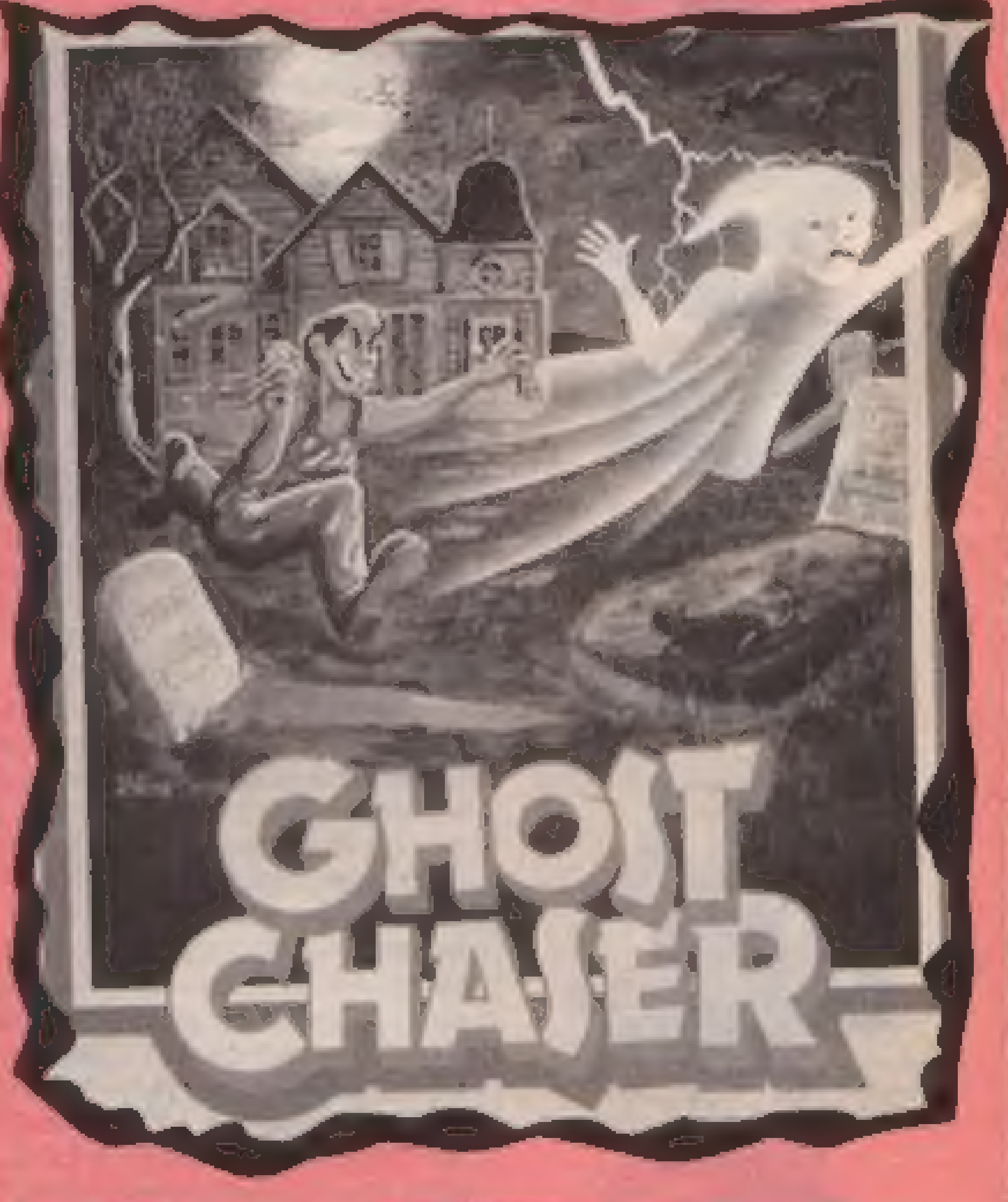
In Raskel and Vortron, C64, and Video's Revenge, BBCB, it's a case of fighting off aliens and superbreeds — a lot of blasting and damning, basically. The final title, Shuffle for the Electron, — a Krypton-Factor co-ordination type game — challenges you to assemble blocks in the shortest possible time.

Under its wing for September, Budgie has another six titles — bringing its list of cheep 'n' cheerful cassettes (could this be the type of pun they're looking for?) to 13 — not bad going for one so young.









Buttons and Bows

Meanwhile in the whatever happened to the BBC and Electron department we find that old software houses never die they simply start to appear at a budget price.

CDS in Doncaster bought the programs from Grimsby based MRM software some months ago and they have now released them under the Blue Ribbon label, perhaps the name has something to do with having it all tied up?

The range currently contains ten titles for the BBC and three for the Electron all priced at £2.50 with a BBC disc of five games available for £9.95. The BBC titles are **Q*man, Darts, Screwball, Q*man's Brother, Secret Same 1** and **Bananaman 3D Munchy** and **Hangman, Secret Same 2** and **The Guy in the Hat**.

The games available for the BBC and Electron are **Castle Assault, Diamond Mine** and **Nightmare Maze**. All the games were on sale at the recent Acorn Exhibition and Blue Ribbons were fluttering everywhere.

The Secret of St. Bride's

Frankly, I had grave doubts about reviewing this. An adventure game set in a girls' boarding school didn't really seem likely to provide much competition for the more "fantastic" type of game that is the norm among adventures (dwarves, spaceships, that sort of thing). However, I really quite enjoyed it once I started.

It seems that St. Bride's is a real, honest-to-goodness, old-fashioned girls' school in Ireland though there are no details in the instructions. I assume that this adventure was written by one or more of the pupils there. The plot casts you as Trixie Trinian who is visiting the school in the present day, but discovers that all the pupils and staff really believe they are living in the 1930's. Accompanied by your friends, Cynthia and Fiona, you must seek out the school's bizarre secret and restore normality.

The game was written with, and makes good use of, The Quill and The Illustrator by Gilsoft. It's by no means perfect as there are a number of responses which, though quite predictable, are not catered for. In one location there are some stairs "to the North, leading up", but though the command "Up" is accepted, "North" isn't. This is a fairly typical flaw, but even so, I found some of the problems quite bizarre, and the "jolly hockey sticks" humour is nicely done (not as ghastly as it could have been).

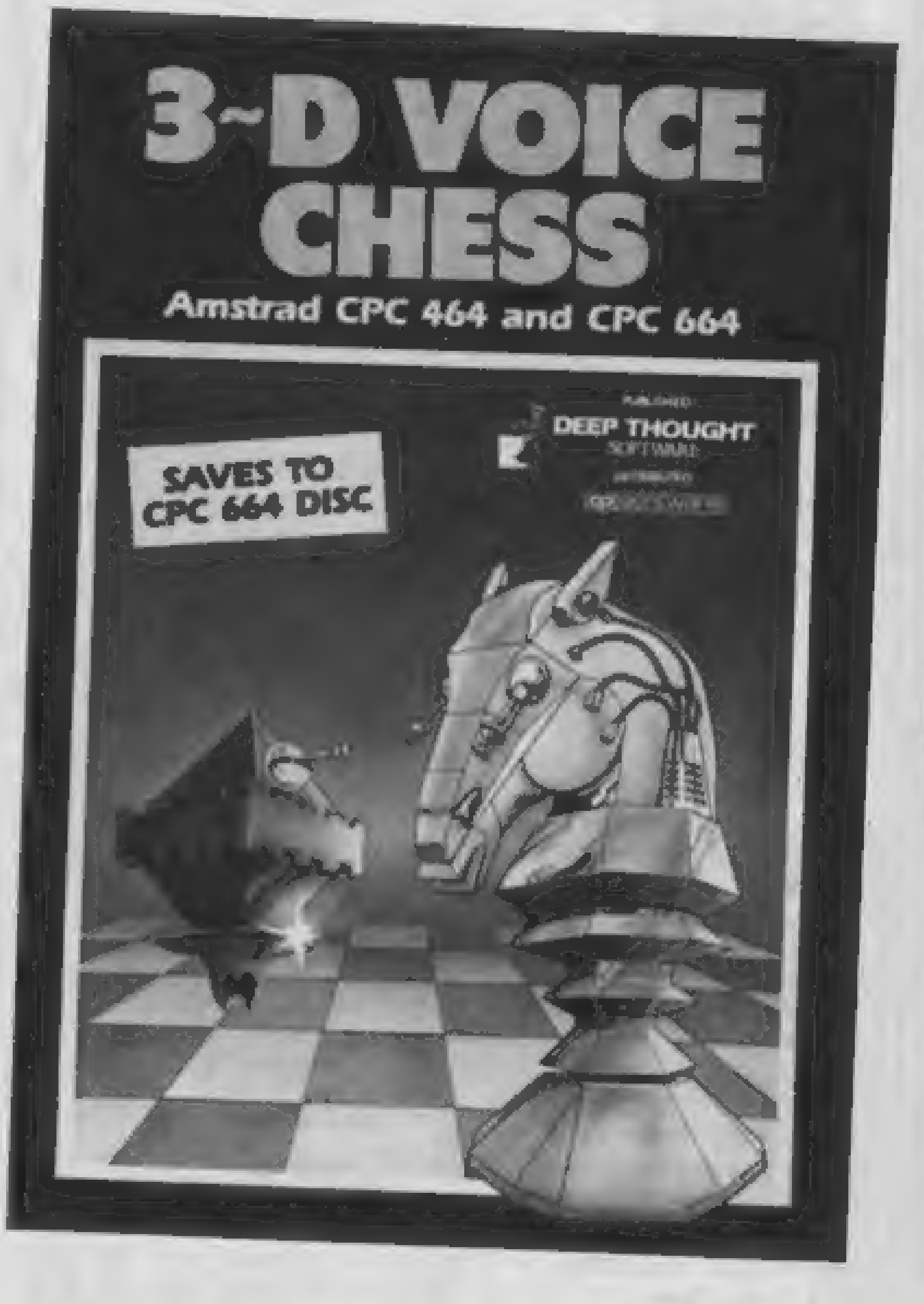
Not, perhaps, la creme de la creme, but a good effort and with a novel setting. **C.J.**

Price: £6.95

Publisher: St Bride's School

Address: Burtonport, County Donegal, Ireland

SPECTRUM



3-D Voice Chess

You won't need the add-on speech generator for this program. It actually speaks its moves on the well-known chess co-ordinate system, though the quality is not good enough to distinguish the words without reading them from the screen too. Perhaps a bit of a gimmick, but an interesting and clever one.

The graphics are more than gimmicky, and stand comparison with the much vaunted QL Chess program; the whole board is shown in fine 3-D, as are the pieces. Not just one view mind; you can turn to view the board from any side, and the effect is just as convincing. All the colours can be redefined too, so instead of sitting in front of glare, or an indistinct green-screen, you can set up as you wish.

I played the computer against Masterchess on the Spectrum. Over three levels and over 200 hundred moves, the Amstrad won once, the other two games were stalemated, though 3-D Voice Chess was notably slower in its responses. Its analyse mode allows alteration of the board, and having set up a chess problem, it acquitted itself well.

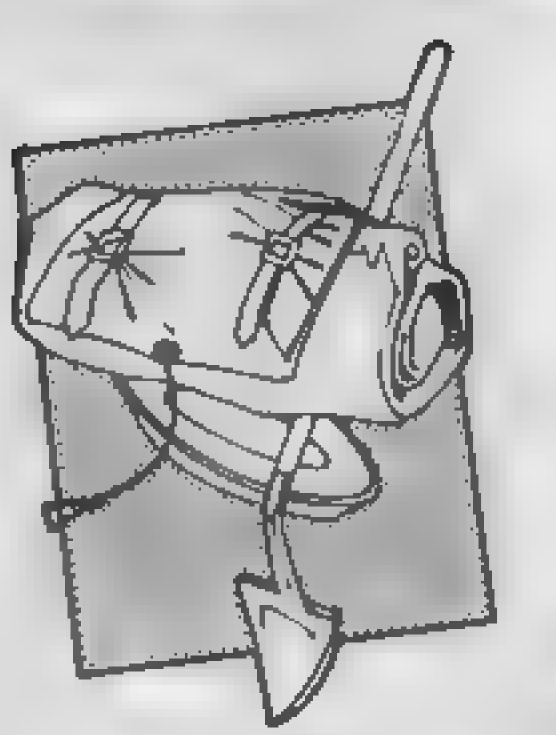
Another very commendable feature is the facility to save the program to disc. Other software houses take note. There's no clock, however, and only about three previous moves are displayed on the screen — there's not much room given to the 3-D. The first chess game I've seen where the standard of graphics matches the amount of work put into the game algorithm. Excellent. **D.M.**

Price: £12.95

Publisher: CP Software

Address: 10 Alexandra Road, Harrogate HG1 5JS

AMSTRAD



Rock Raid

Remember the old arcade game where you have to shoot at a screen full of rocks, flying saucers and ever more fiendish devices, until they eventually beat you and your spaceship? Well this is the Amstrad version — but what a version!

I wasn't impressed until I realised that the rocks which fragment as you shoot them, were in 3-D and rotated about two axes, not just round and round. Very classy. Neither was I too keen on the sound until the single voice tune stopped to be replaced by some very superior sound effects, explosions, blast noises and so on. I became even keener on the graphics when screen two was eventually reached. The colours and more advanced saucers and aliens made it really compelling Movement is generally very smooth, but there is just a hint of flicker when scrolling, rotating, and exploding are all called for at once.

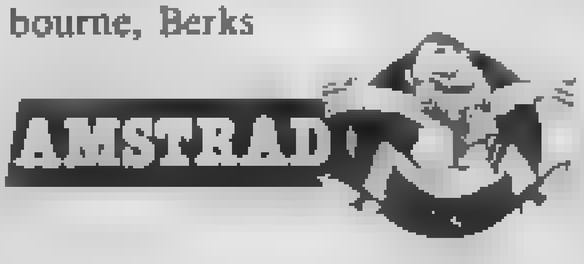
I was, however, impressed from the outset with user facilities, not only redefined keys, but also the facility to choose certain options. Thus you can choose smart bombs, or hyperspace, or shields, or flips, or reverse thrust... you name it, in order to defeat your foe. One of the best demo modes yet seen accompanies a hi-score table that's not entirely impossible to join

For me, the welcome lower price and the sophisticated implementation make up for the lack of originality in concept. If you like shoot 'em ups, you'll flip! **D.M.**

Price: £6.95

Publisher: Kuma

Address: 12 Horshoe Pk, Pangbourne, Berks



Amsoft
Dragons

Dragons

Sorcery deservedly sold on its graphics — the concept being a rework of previous ideas — and I hope Dragons is as successful It may be ladders and levels but...

The screen is strewn with platforms in the shape of 3-D clouds interconnected by vines of delicately drawn flowers, all in Mode 0's full colour. You control an equally well-conceived man who's task it is to collect all the jewels. You must also bump off the dragons — story book creatures of different colours, shaded to give a 3-Deffect— but not with anything so crude as a sword!

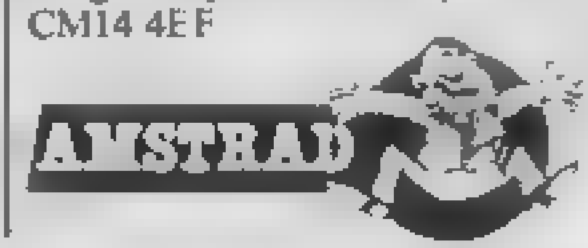
Across the top of the screen the white Queen Dragon majestically, and smoothly, flies laying 3-D eggs which come to rest on various clouds Guide your man to them, then gently push them off onto the nearest dragon. But don't get caught yourself, or you'll lose a life. Kill the dragons and you're off to the next of 20 screens, though the colour choice for screen 2, which is as far as I went, could have been much better The different colours of dragons possess different attacking capabilities, so the game isn't easy, and they often change colour in response to your play

What made this memorable for me, and for my resident team of testers, were the genuinely charming graphics, the very hummable stereo tunes, and the sound effects. For us, the best ladders and levels graphics yet seen on the Amstrad. **D.M.**

Price: £8.95

Publisher: Amsoft

Address: Brentwood Hse, 169 Kings Rd, Brentwood, Essex CM14 4EF



SPECTRUM 48K
pocket money software

Valley of the Dead

You must rescue three explorers, who are trapped at the bottom of deep caverns, by travelling down each cavern in your hot air balloon. Each cavern takes up several screens.

Controls are left, right and boost, which temporarily increases your height. As you are continually falling — perhaps the balloon has sprung a leak — to travel horizontally it is necessary to use frequent short bursts of boost, but it is very difficult to maintain any desired height. There's no joystick option.

The score depends on the height of the balloon in the cavern, which isn't a good measure of progress on many of the screens. The caverns are difficult to negotiate due to ragged edges and stalagtites, stalagmites and moving objects which all must be avoided. You can choose which of the three caverns to attempt; supposedly, easy, medium and hard, but I found them all extremely difficult. You also have the option of loading two other sets of caverns, but on my copy the program crashed while in the middle of loading them.

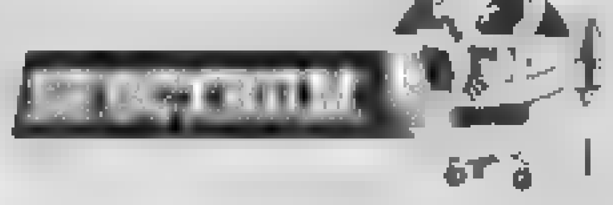
When selecting options, or starting, the key response is very slow, due to irritating tunes being played which can't be switched off.

Although the task is to avoid the alien in a confined space an incredible degree of co-ordination and timing is required. This is a simple idea made very difficult and would seem to guarantee hours of frustration. **S.J.E.**

Price: 99p

Publisher: Pocket Money Soft-[illegible]

Address: 300 Chesham House, 150 Regent St, London



★★★★★

Flipped

★★★★

Hooked

★★★

Keen

★★

Yawning

★

Comatose

pocket money software

Devil's Descent

You are a fearless space commander who must rescue a fleet of eight space ships by piloting each one through a cavern, known as the devil's descent, which is 40 screens deep.

Your ship is permanently falling but you can move left and right to avoid the numerous stationary obstacles and the cavern walls, in other words avoid everything that isn't black — Henry Ford would have approved! In each direction you may move slowly or fast, if you press both keys you move very quickly, necessary if you are to negotiate the trickiest screens. However, this arrangement is very difficult to get the hand of — both in judging the correct speed and pressing the appropriate key. There is no joystick option

When you have completed a descent you return to the start with a faster ship — or shop according to the instructions! There are also four skill levels which slightly affect the speed.

There is a demo mode, and you are given the welcome option of a training mode which allows you to practice on each screen.

Graphics are adequate, with many of the objects being repeated on different screens, but if you travel close to the edge of the cavern, the ship's green colour overwrites part of it, leaving behind a trail of green blobs.

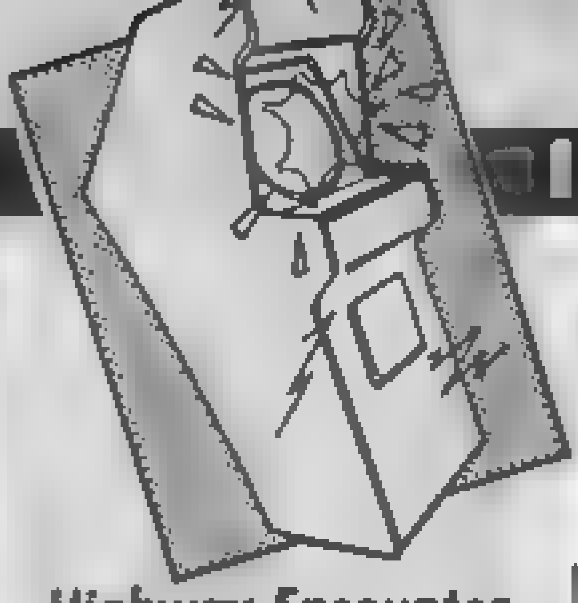
Devil's Descent is just a dodgem game and I doubt it will appeal for long. Although it is very cheap, I would recommend saving up to buy a more interesting game. S.J.E.

Price: 99p

Publisher: Pocket Money Soft-[redacted]

Address: 300 Chesham Hse, 150 Regent St, London

SPECTRUM



Highway Encounter

From the author of TLL comes this latest of Vortex's 3-D shoot-em-ups. Once again the humble player is earth's last hope. All that stands between the aliens and world domination is a highway. You must travel down 30 zones of this road, zapping the various droids trying to stop you, until you reach their stronghold, zone zero. There you need to place the lasertron, the world's most powerful weapon, and thus save the world.

You control a vorton, which is a daleck type droid and one novel feature is that your back up lives are also on screen — their task is to shunt the lasertron across a central path, which you must clear for them They can be destroyed independently of you, so you have to protect your future lives as well as the present one! The back up vortons have no intelligence and move along at constant speed until something blocks their way.

Graphically, Highway Encounter is superb. The main action is in Knight Lore style 3-D, excellently animated. Another similarity to Knight Lore is the way obstacles like barrels and bricks can be pushed — or even shot — about. There are some good, colourful background scenery graphics, particularly the bridges. Sound is suitably exciting

As an action game this is brilliant, lots of aliens to shoot, with a reasonable challenge and plenty of initial addictivity. I think it's a little overpriced however, and I found the enclosed instructions too brief, although the program has good on-screen instructions and a useful demo. I also had some loading difficulties, and had to use my walkman! Generally a polished product which should be well received by the arcade addicts. S.J.E.

Price: £7.95

Publisher: Vortex

Address: Vortex Hse, 24 Kansas Av, South Langworthy Rd, Salford M5 2GL

SPECTRUM

Amsoft
BRAXX BLUFF

Braxx Bluff

A conversion of one of my Spectrum favourites of last year which never got the attention it deserved, Braxx Bluff casts you in the role of rescuer of the three members on a mission to the planet Prolon

Your mission has six phases. First you must boost out of orbit and guide your craft to the surface of the planet using a guidance system and retro rockets. If you don't score high enough, it's back to the beginning. So indeed with the following phases where you must seek the rover vehicle, then pilot it through a swamp, a ruined city and a desert whilst shooting marauding creatures, and finally, skim over the surface of an ocean, avoiding rocks until the base ship is found. Take too long though, and the crew die before you can get to them.

Player facilities are very full, keys can be redefined, and your game position can be saved not only to tape, but into memory, to be recalled when you botch the next bit, so you don't have to go right back to the beginning. Well done Micromega.

Stereo sound is good, but the 3-D graphics which so impressed me on the Spectrum don't seem to have been improved any for this more sophisticated screen and are beginning to show their age now, though the game itself seems easier to play

Even so, I find this very addictive, interesting and enjoyable, though a little over priced. D.M.

Price: £8.95

Publisher: Amsoft

Address: Brentwood Hse, 169 Kings Rd, Brentwood, Essex CM14 4EF

AMSTRAD

War Zone

War Zone is a computer simulation of a battlefield, but unlike many similar programs, it is not set in a definite historical or geographical area. Indeed I like the fact that in each game a slightly different terrain is drawn, with the same features of hills, minefields, woodland and roads, but distributed randomly. The player takes the blue army, consisting of tanks, artillery and infantry, selecting any combination required between a total of 15 and 150 pieces. The computer takes an equal number, and distributes the figure for the start of action, which takes the form of alternate turns.

The battlefield is a 3 x 3 grid, and the player can view any square in which blue troops are present. The range of available commands is easy to remember, and includes moving troops, firing from one square to another, and even asking for an air-raid on an enemy piece, always within certain restraints of range etc. Troops meeting in adjacent squares indulge in hand-to-hand combat, with occasional surprise results. The player's surviving pieces are clearly displayed, but I often wanted to know the current strength of the opposing army, and my computer wouldn't tell me!

The computer plays a cagey and strong game, and it was a long while before I could celebrate victory. On many occasions, I felt the computer almost settled for a draw when outnumbered. The graphics are designed for clarity rather than spectacular effect, but the prompt keyboard response and challenging nature of the game made it a winner for me. P.T.

Price: £6.95

Publisher: C.C.S. Ltd

Address: 14 Langton Way, London SE3 7TL

AMSTRAD

BLUE RIBBON
CASTLE ASSAULT
ELECTRON

Castle Assault

A glittering reward awaits the intrepid who reach the top of the heavily defended towering turrets of this forbidding fortress. On your quest for gold, you will be assailed by menacing crabs, snakes, lobsters, spiders, bugs and beetles. Watch out for the deadly flying duck and avoid the falling rocks... and so the preamble on the inlay card goes on. Unlike many similar blurbs, this one actually depicts the game rather well

Basically you control a very well animated multi-coloured character who jumps over the bouncing meanies and onto moving platforms in order to get to the top of the screen whilst avoiding falling rocks and the deadly flying duck

The graphics in this game are very good. The characters move smoothly and quickly without disturbing the detailed background graphics — good enough to make you think the Beeb had hardware sprites! The characters themselves are colourful and well defined The sound effects are also well done, especially the quacks of the flying duck which leisurely crosses the screen flapping its wings! All the usual extra features such as freeze, sound on/off, hall of fame and a neat title page, are there

The game is fun, challenging and professionally presented. It may not be quite up to the standard of some of the recent Acornsoft, Imagine and Ultimate releases but what gives this game its rating is its price A first class game sold at the price of a budget game, but don't forget, this game was originally available from MRM software. **S.S.**

Price: £2 50

Publisher: Blue Ribbon Software

Address: Silver Hse, Silver St, Doncaster, S Yorks

Mig Alley Ace

At last, US Gold have re-released this old Microprose classic. Set in the Korean war, you are locked in deadly combat with Chinese-built fighter planes. Five scenarios can be chosen from or run together to form an ongoing campaign, and there are three levels of play

Although this is no Sublogic flight simulator, all basic flight information needed is presented on screen — speed, altitude, ammo, power and a rear mirror

The cockit view is spartan — blue equals sky and green ground; control is by joystick with throttle and ejector seat manipulated by keyboard — the latter is essential when playing the computer!

The joy of this game is that you can play the computer, or a friend. A la "Pitstop II", the screen is split into upper and lower halves, each showing the view from a respective cockpit Hence the enemy can see your plane dwindling away into the distance!

There is an additional option to allow two players to act in unison against one or two computer pilots — this is useful, with the computer playing a mean opponent, especially on higher levels Instructions provided with the game are concise and easy to read

The split screen system works well and despite the obvious limitations of the graphics, is a fun game to play. Overall this is a good addition to any games collection, although a little overpriced. Not as enjoyable as F-15 Strike Eagle, but the two-player mode compensates for its simplicity. **G.C**

Price: £9 95

Publisher: US Gold

Address: Unit 10, The Parkway Ind Centre, Heneage Street, Birmingham

BBC
BEACH-HEAD
U.S. GOLD
All American Software
ACCESS
BBC

Beach-Head

At last the flow of good American software imported by U.S. Gold reached the Beeb! After months of mouth-watering ads in the computer press for classic C64 games, comes this reasonably good implementation of the 64 games for the BBC. Not before time

The theory is easy enough — land troops on a beach-head and then advance to defeat 'the dictator' at his fortress. If rumours of the game's addictiveness have reached you then the very long loading time won't faze you and once past it you're into a multi-screen, 3 D, zappy sound, multi-skill level and joystick compatible game that is compulsive enough to keep you attacking until the early hours

First, you have to decide whether to go for a straight frontal assault or try a sneaky touch and slide through the secret passage. The frontal approach is easy but you then have to do more work later; the passage is a separate screen where you have to manoeuvre your ships past mines and torpedoes. It's worth the effort, though, as the next stage ('General Quarters') consists of wave after wave of planes attacking however many ships you've managed to sneak through. If you've been cowardly and taken the frontal route, then you have to shoot down far more planes.

The fighters take a bit of practice to blast from the skies and the best tip is to move your guns laterally and let the planes fly into the stream of hot lead — if you chase them up and down the sky you'll find the next wave is upon you. Assuming you survive the planes, you next have to excel at naval bombardment — the screen doesn't change but the enemy ships start shelling. Return their fire (helped by 'short' or 'long' messages) and you move ever onward to the actual beach-head

Land your tanks and move through the defence systems until the final battle — the attack on Kuhn-Lin fortress Having only 10 shells, you must destroy the fortress making every shot count — there are 10 targets but only one appears at a time. Here, you'll feel the need for tanks as the fortress cannon never misses

All in all, an excellent game. While some may question the morality of such unabashed paeans to brutality and macho adventurism, the truth at the game's end is that it is well-designed, compulsive and excellent value. The loss of quality from the Commodore original is minimal and with the numerous scenarios it offers a range of games for the price of one

What annoys me is that I've just seen Beach-Head II for the C64 and it's even better — how long. U S. Gold? How long? **D.R.**

Price: £9 95

Publisher: U.S Gold

Address: Unit 10, The Parkway Indus Estate., Heneage Street, Birmingham B7 4LY.

SPECTRUM GAME

TRYING YOUR PATIENCE

No chance of a card up your sleeve in this on-screen version of Patience in a 16/48K Spectrum game from David West

Irritated, angry, hot-under-the-collar? What you need is a little computer-age Patience

Just try your luck with the 28 cards which are dealt from a shuffled pack, into seven piles — one card in the first, seven in the seventh — bottom cards face-up. The rest of the cards form the stock which are turned over in three's — traditionally only three times — but this is optional.

Cards are placed on the piles in descending order and on opposite colours, kings being placed on empty piles. You win by getting all the cards onto four "home" piles, each running from ace to king in the same suit

[illegible]

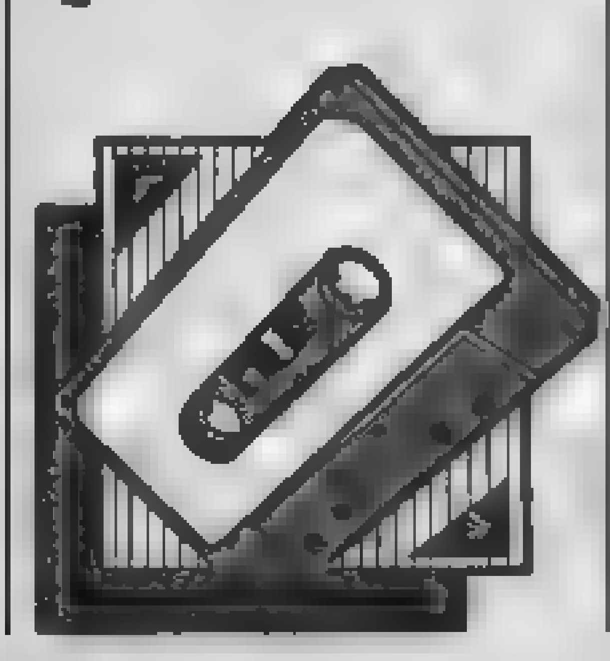
How to play

T turn up next card
Tx turn-up to pile x
xy pile x to pile y
H turn-up to Home
X card on pile x to Home
Q quite game

Variables

c$,n%,fn z$(a$) the cards
p$(7,21),s$,t$,h$ the cards as played
w$ win check
r rounds

Please note: All the Spectrum listings in HCW are printed to a special format. All user defined characters are printed as capital letters but with an underline. In order to type them into your computer you need to place the machine [illegible] mode and then press the capital letter indicated. [illegible]

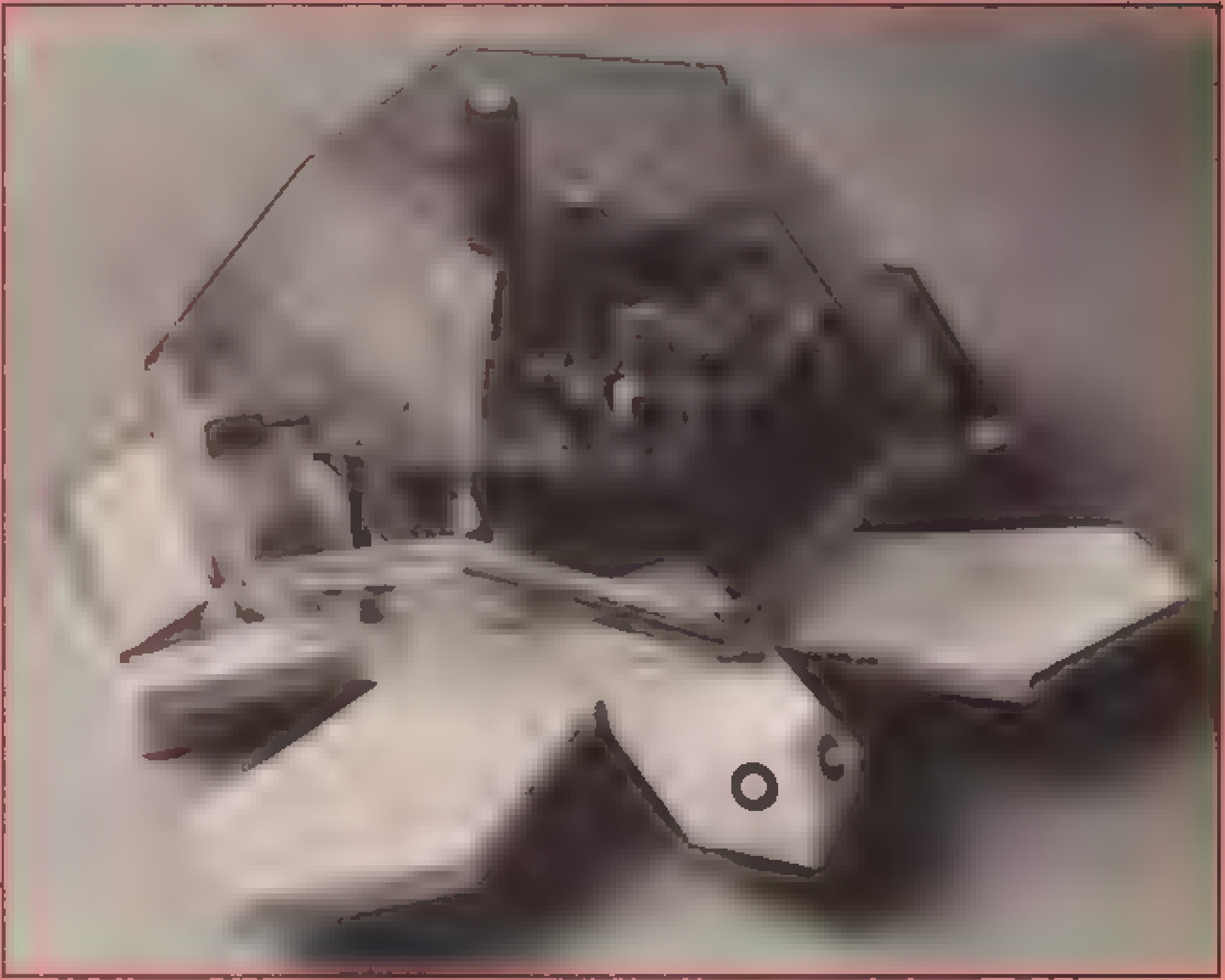


```
      0>DEF FN R(
N)=USR 0:DEF FN B(N)=USR 0:DEF FN C(N)=USR 0:
DEF FN I(N,A$,B$)=USR 0:DEF FN A(N,N)=USR 0:D
EF FN K$(N,N)=USR 0:DEF FN Q(N,N)=USR 0:DEF F
N X(N,N)=USR 0:DEF FN C$(N)=USR 0:DEF FN N(C$
)=USR 0:DEF FN H$(N)=USR 0:DEF FN D(H$)=USR 0
:DEF FN U$(B$,N)=USR 0:DEF FN S$(N,S$)=USR 0:
DEF FN P(N)=USR 0:DEF FN B$(N)=USR 0:DEF FN T
$()=USR 0:DEF FN M$()=USR 0:DEF FN V(N,N)=USR
 0:DEF FN M()=0-USR 0:DEF FN F()=USR 0:REM :R
[illegible]
   5 DEF FN Z$(A$)=CHR$ 16+CHR$ (2 AND CHR$ (
144+INT ((CODE A$-1)/13))<"C")+N$(CODE A$-(IN
T ((CODE A$-1)/13)*13))+CHR$ (144+INT ((CODE
A$-1)/13))
   9 REM
  10 REM *********************
  11 REM *                   *
  12 REM * A D PATIENCE C B *
  14 REM *                   *
  15 REM *********************
  16 REM
 100 RANDOMIZE
 110 GO SUB 9000
 200 GO SUB 8000
 210 GO TO 1100
1000 REM NEW DEAL---------------
1010 GO SUB 6000
1020 PRINT #0;AT 1,0;" [ PRESS ANY KEY FOR NE
W DEAL ] ": BEEP .1,20
1030 IF NOT CODE INKEY$ THEN  GO TO 1030
1100 LET R=0: CLS : GO SUB 7000
2000 REM INPUT------------------
2010 IF H$=W$ THEN  GO TO 5000
2020 BEEP .1,20
2030 POKE 23658,0
2040 [illegible]T "YOUR PLAY: ";A$
2050 IF A$="" THEN  GO TO 2020
2060 IF A$="T" THEN  GO SUB 2500: GO TO 2020
2070 IF A$="H" THEN  GO SUB 4000: GO TO 2000
2080 IF A$="Q" THEN  GO TO 6000
2090 DIM A(2)
2100 IF A$(1)>="1" AND A$(1)<="7" THEN  LET A
(1)=VAL A$(1)
2110 IF LEN A$>1 THEN  IF A$(2)>="1" AND $(2)
<="7" THEN  LET A(2)=VAL A$(2)
2120 IF A(1) AND A(2) THEN  GO SUB 3500: GO T
O 2020
2130 IF A(2) THEN  GO SUB 3000: GO TO 2020
2140 IF A(1) THEN  GO SUB 4500: GO TO 2000
2150 GO TO 2000
2500 REM TURN CARD--------------
2510 IF T$="" THEN  GO TO 2690
2520 FOR F=1 TO 3
2530 IF S$="" THEN  GO SUB 2900
2540 LET T$=S$(LEN S$)+T$
2550 LET S$=S$( TO LEN S$-1)
[illegible] IF LEN S$ THEN  PLOT  OVER 1;16,LEN S$*2
+31: DRAW  OVER 1;15,0
2570 IF S$="" THEN  PRINT AT 10,2;"  "
```

```
2580 PLOT 40,LEN T$*2+29: DRAW 15,0
2590 NEXT F
2600 PRINT AT 18,5; PAPER 7;FN Z$(T$)
[illegible]
2900 REM (T$)S$)--
2910 LET R=R+(R<3)
2920 IF R=3 THEN  BEEP .1,0
2930 PRINT AT 20,8-R*2;" " AND R
2940 LET S$=T$: LET T$=""
2950 GO SUB 7100
2990 RETURN
3000 REM TU>#-------------------
3010 IF T$="" THEN  GO TO 3190
3020 LET L$=T$: GO SUB 3800: IF NOT CH THEN
GO TO 3190
3030 LET P$(A(2),CODE P$(A(2))+3)=T$(1)
3040 LET P$(A(2),1)=CHR$ (CODE P$(A(2))+1)
3050 LET P$(A(2),2)=CHR$ (CODE P$(A(2),2)+1)
3060 LET T$=T$(2 TO )
3070 IF T$="" THEN  LET T$=S$: LET S$="": LET
 R=R-1: GO SUB 7100: GO TO 3100
3080 PRINT AT 18,5;"  "
3090 IF LEN T$ THEN  PRINT AT 18,5; PAPER 7;F
N Z$(T$): PLOT  OVER 1;40,LEN T$*2+31: DRAW
OVER 1;15,0
3100 LET L=A(2): GO SUB 7500
3190 RETURN
3500 REM #>#--------------------
3510 LET L$=P$(A(1),CODE P$(A(1))-CODE P$(A(1
),2)+3): GO SUB 3800: IF NOT CH THEN  GO TO 3
590
3520 LET P$(A(2),CODE P$(A(2))+3 TO )=P$(A(1)
,CODE P$(A(1))-CODE P$(A(1),2)+3 TO )
3530 LET P$(A(2),1)=CHR$ (CODE P$(A(2))+CODE
P$(A(1),2))
3540 LET P$(A(2),2)=CHR$ (CODE P$(A(2),2)+COD
E P$(A(1),2))
3550 LET P$(A(1),1)=CHR$ (CODE P$(A(1))-CODE
P$(A(1),2))
3560 LET P$(A(1),2)=CHR$ (1 AND CODE P$(A(1))
)
3570 LET L=A(1): GO SUB 7500
3580 LET L=A(2): GO SUB 7500
[illegible]
3800 REM L$>#?--
3810 IF FN Z$(L$)(3)="K" THEN  LET CH=NOT COD
E P$(A(2)): GO TO 3890
3820 LET A$=P$(A(2),CODE P$(A(2))+2)
3830 LET CH=(FN Z$(L$)(2)<>FN Z$(A$)(2) AND N
$(CODE L$-(INT ((CODE L$-1)/13)*13)+1)=FN Z$(
A$)(3))
3890 RETURN
4000 REM TU>HOME-----------------
4010 IF T$="" THEN  GO TO 4990
4020 LET A=CODE FN Z$(T$)(4)-143
4030 IF CODE T$<>CODE H$(A) THEN  GO TO 4990
4040 LET T$=T$(2 TO )
4050 IF T$="" THEN  LET T$=S$: LET S$="": LET
 R=R-1: GO SUB 7100: GO TO 4000
4060 PRINT AT 18,5;"  "
4070 IF LEN T$ THEN  PRINT AT 18,5; PAPER 7;F
N Z$(T$): PLOT  OVER 1;40,LEN T$*2+31: DRAW
OVER 1;15,0
4080 GO TO 4800
4500 REM #>HOME-----------------
4510 IF NOT CODE P$(A(1)) THEN  GO TO 4990
4520 LET A=CODE FN Z$(P$(A(1),CODE P$(A(1))+2
))(4)-143
4530 IF CODE P$(A(1),CODE P$(A(1))+2)<>CODE H
$(A) THEN  GO TO 4990
4540 LET P$(A(1),1)=CHR$ (CODE P$(A(1))-1)
4550 LET P$(A(1),2)=CHR$ (CODE P$(A(1),2)-1)
4560 IF CODE P$(A(1)) AND NOT CODE P$(A(1),2)
 THEN  LET P$(A(1),2)=CHR$ 1
4570 LET L=A(1): GO SUB 7500
4800 REM CD>HOME--
4810 PLOT 14+(CODE W$(A)-CODE H$(A))*2,160-A*
16: DRAW 0,7
4820 PRINT AT A*2+1,5; PAPER 7;FN Z$(H$(A))
4830 LET H$(A)=CHR$ (CODE H$(A)+1)
4990 RETURN
5000 REM WIN--------- ---    --
5010 PRINT #0;AT 1,0; INVERSE 1;"          WELL
 PLAYED ! ! !",: BEEP 1,40
5990 GO TO 1000
6000 REM QUIT-------------------
6010 PRINT #0;AT 1,0; INVERSE 1;"          GAM
E ABANDONED",: BEEP 1,0
6020 LET R=1: GO SUB 7000
6090 GO TO 1000
7000 REM DISPLAY- -- ------ -----
7010 FOR F=1 TO 7
7020 PRINT AT 0,F*3+7; INK 6;F
7030 FOR G=1 TO CODE P$(F)
7040 LET A=7*(G>CODE P$(F,1)-CODE P$(F,2))
7050 IF R AND NOT A THEN  LET A=5
7060 PRINT AT G+1,F*3+7;
7070 IF A THEN  PRINT  PAPER A;FN Z$(P$(F,G+2
))
7080 IF NOT A THEN  PRINT  PAPER 7; INK 3;"FG
"
7090 NEXT G: NEXT F
7095 PRINT AT 20,2; INK 6;"D D D"
7100 FOR G=12 TO 18: PRINT AT G,2;" .  ": NE
XT G
7110 IF LEN S$ THEN  PRINT  PAPER 7; INK 1;AT
 18,2;"FG"
7120 FOR G=1 TO LEN S$-1
7130 PLOT 16,G*2+31: DRAW 15,0
7140 NEXT G
7150 IF LEN T$ THEN  PRINT  PAPER 7;AT 18,5;F
N Z$(T$)
7160 FOR G=1 TO LEN T$-1
7170 PLOT 40,G*2+31: DRAW 15,0
7180 NEXT G
[illegible] RETURN
7500 REM  PRINT PILE-------------
7510 FOR F=20 TO CODE P$(L)-CODE P$(L,2)+1 ST
EP -1
7520 PRINT AT F+1,L*3+7;
7530 IF F<=CODE P$(L) THEN  PRINT  PAPER 7;FN
 Z$(P$(L,F+2)): GO TO 7550
7540 PRINT "  "
7550 NEXT F
7590 RETURN
8000 REM SHUFFLE+DEAL-----------
8010 FOR F=1 TO 40
8020 LET R=INT (RND*52+1)
8030 LET R1=INT (RND*52+1)
8040 LET A$=C$(R): LET C$(R)=C$(R1): LET C$(R
1)=A$
8050 NEXT F
8100 DIM P$(7,23)
8110 LET A=1
8120 FOR F=1 TO 7
8130 LET P$(F)=CHR$ F+CHR$ 1+C$(A TO A+F-1)
8140 LET A=A+F
8150 NEXT F
8160 LET S$=C$(A TO 49)
8170 LET T$=C$(50 TO )
8180 LET H$=CHR$ 1+CHR$ 14+CHR$ 27+CHR$ 40
8190 RETURN
9000 REM INITIALISE-------------
9010 POKE 23693,15: BORDER 1: CLS
9020 POKE 23609,9
9030 LET C$="": FOR F=1 TO 52: LET C$=C$+CHR$
 F: NEXT F
9040 LET N$="A23456789EJQK"
9050 LET W$=CHR$ 14+CHR$ 27+CHR$ 40+CHR$ 53
9060 FOR F=0 TO 55: READ A: POKE USR "A"+F,A:
 NEXT F
[illegible]
9100 DATA 16,56,124,254,124,56,16,0: REM A=A
9110 DATA 68,238,254,254,124,56,16,0: REM B=B
9120 DATA 56,56,198,254,198,16,56,0: REM C=C
9130 DATA 16,56,124,254,214,16,56,0: REM D=D
91400,76,82,82,82,82,76,0: REM E=E
9150 DATA 0,125,106,85,85,106,125,0: REM F=F
9160 DATA 0,198,86,170,170,86,198,0: REM G=G
9999 SAVE "PATIENCE" LINE 1: VERIFY "": STOP
```

PERIPHERAL

Margaret and Allen Webb explain why the Valiant Turtle/Commodore Logo package is both educational and fun to use



This package actually comprises two items. The system is Commodore's Logo package which is used to drive the Valiant Turtle.

Before attempting to describe the performance of these items, it is best if we discuss the value of the system. Logo is a language which was developed specifically to aid the teaching of programming to young children. The designers realised the value of visual aids in education and built the system around a turtle which creeps around a graphics screen. At this point we must add that Logo also has excellent text handling facilities and simple mathematics routines

To the BASIC user, Logo will appear to be a little odd. Similar to Forth, Logo allows you to create your own procedures in terms of fundamental in-built functions or primitives. Such procedures are called by name and can be used by other functions. Structurally this can be compared to an onion — with primitives in the middle and subsequent procedures as layers. A particularly powerful feature is the ability of procedures to actually call themselves (recursion is the exact phrase). Rather than tying the machine in a knot, this capability allows the creation of both elegant and powerful structures.

The best known feature of Logo is the ability to move the turtle by simple commands such as FORWARD, LEFTTURN and RIGHTTURN. Using such primitives, it is simple for a child to develop drawing routines.

The Logo comes on two discs with a huge instruction manual. One disc simply holds the language and the second holds a collection of demonstration and utility routines. The demonstrtions are fairly impressive showing many of the features of the language, a particularly striking example of which is a simple adventure which functions quite efficiently. Utilities include a suite of routines for drawing arcs and an assembler.

The Commodore Logo has a number of extensions to allow for the special features of the C64. Sprite, sound control and multicolour plotting are all supported. The manual is a joy to use being comprehensive with lots of projects and examples to try out. The book is A5 size and was nearly an inch thick. Great value!

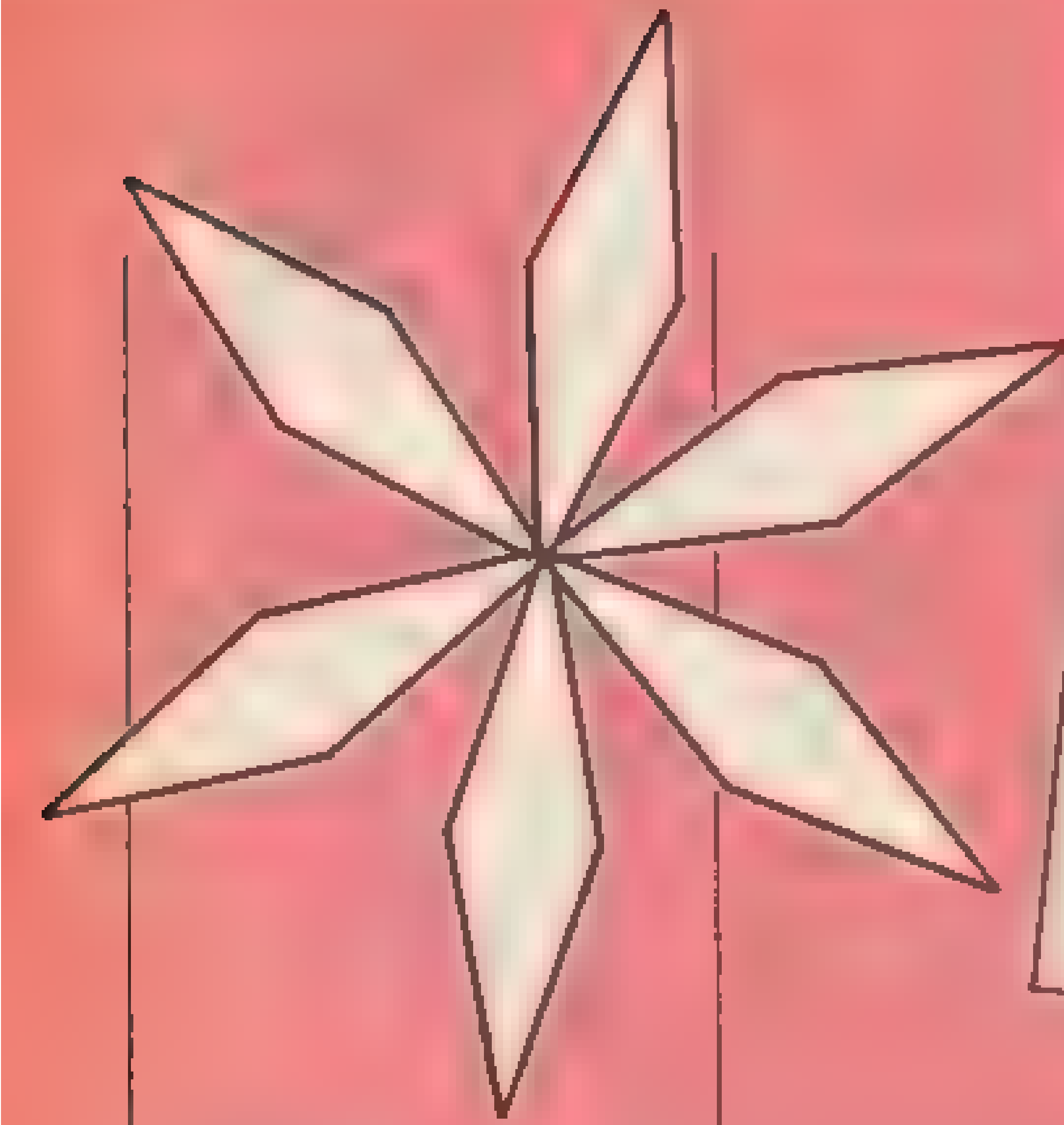
Commodore Logo

Price: £34 95

Publisher: Commodore Business Machines

Address: 1 Hunter Rd, Weldon, Corby, Northants

C64



The Valiant Turtle is a robot which can be controlled by the computer. Not surprisingly it looks roughly like a turtle and has a green clear plastic shell. It has two driving wheels and a single ball pivot. In a manner similar to tanks, movement is controlled by driving the wheels in either direction. No wires are needed since the turtle is driven by infra-red remote control. The control unit plugs into the computer users port and is powered by mains

On unpacking, the first job is to give the turtle 16 hours of charging. You'll know when it's ready to go when its eyes glow red! After connecting up the control unit and plugging the pen into the turtle, load Logo and you're ready to start. A disc with the turtle provides the necessary patch into the Logo. The setting up of the system is simple and generally without problems

Once it's going, any of your programs will drive the turtle and draw pictures on a sheet of paper. One problem is the scale-factor between the screen and the turtle. A small move on the screen-turtle moves the robot quite a distance. The first time we tried it, the turtle shot off the paper and drew a green line on our carpet!

As you may have noticed, the Valiant Turtle isn't cheap and we feel that its main area of use will be in schools. The movement of the turtle under command entranced our son who gave squeals of delight each time it moved. This suggests it will be a hit with youngsters

Even if you can't afford the hardware the software package is an excellent investment in itself. The command structure is such that it is simple, even for the complete beginner, to develop interesting routines and impressive designs. Overall, two excellent products. **M.W. & A.W.**

Valiant Turtle

Price: £199.00

Manufacturer: Valiant Designs

Address: Park Hse, 140 Battersea Pk Rd, London SW1 4NB

C64

COMING SOON

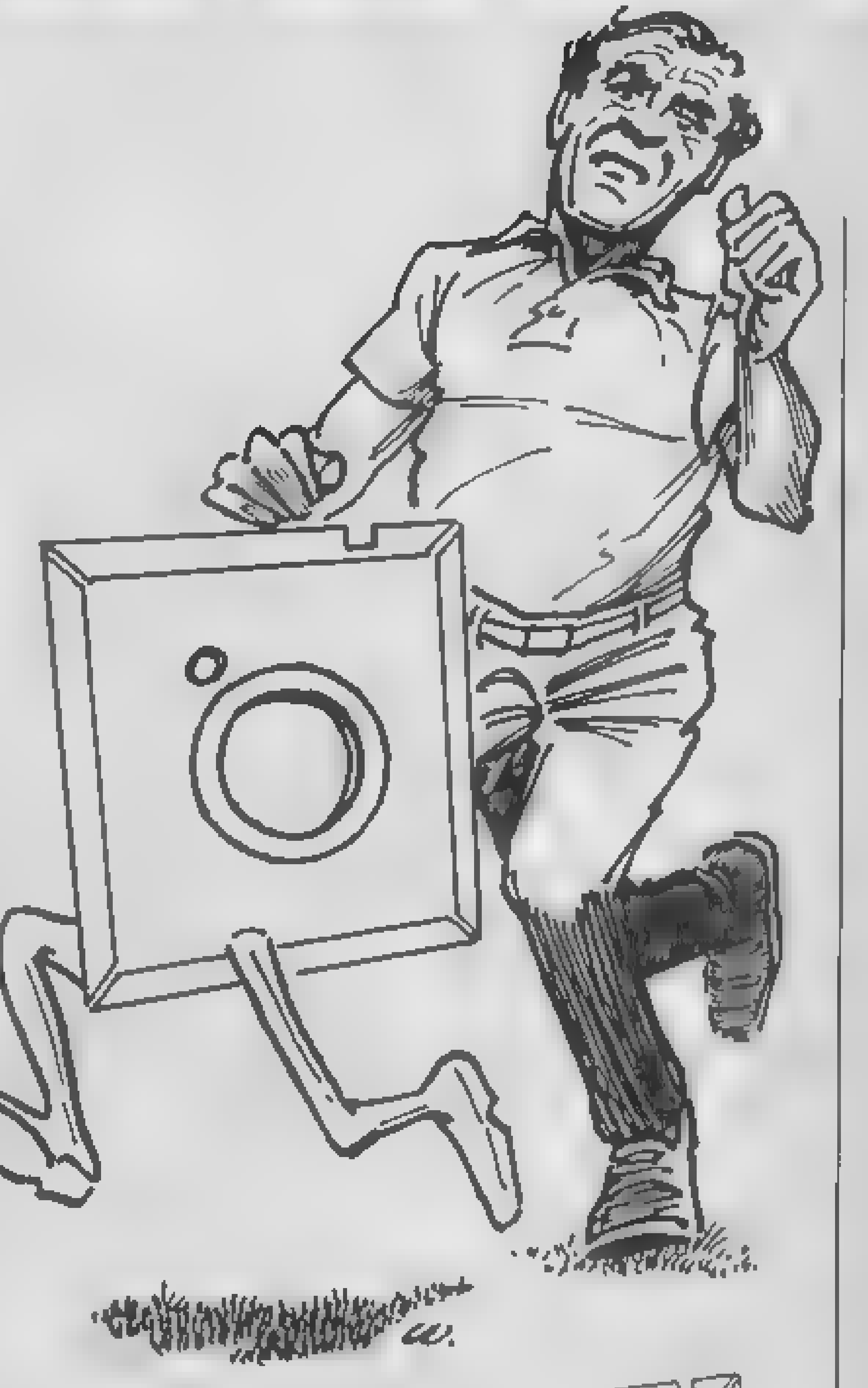
To a Spectrum near you

50% bigger and better games....

MIKRO-PLUS

DISKMAN

Munch your way round the maze in pursuit of succulent software in this game for the C64 by R Brown



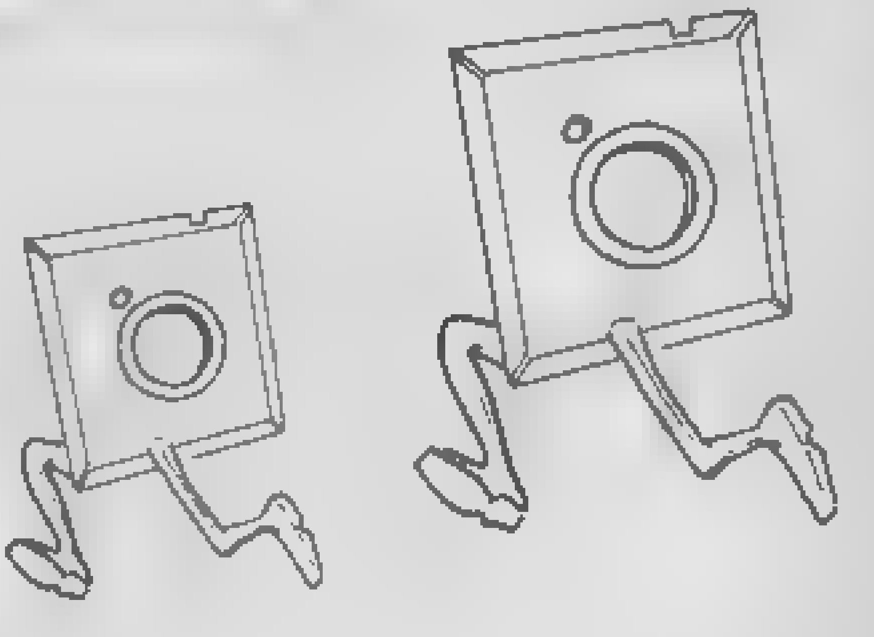
The character in this game has no trouble absorbing information — he eats it in disc form Quite how he developed this taste for floppy food is a mystery but now he won't eat anything else.

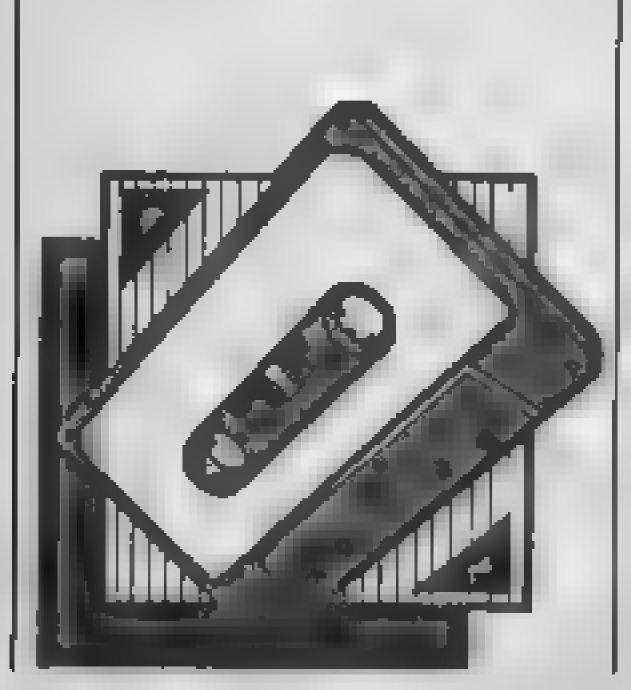
How it works

- 2-3 check for character redefinition
- 10-30 reads character set into RAM. (New character set shape obtained by shifting four rows of each character right one pixel)
- 50-65 read in UDG data
- 100-199 print the screen
- 200-299 read in data for sprites, music and machine code
- 300-327 set up sprites and SID chip
- 330-347 set up various information for machine code
- 350 calls the machine code
- 360 check for lives left

Variables

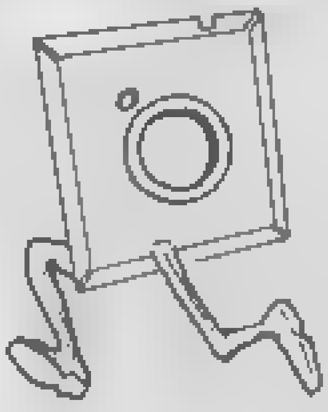
- L memory location used to store the no of lives left
- E memory location used to store energy left
- S start of SID chip
- V start of VIC ship
- R variable for various readings of data etc

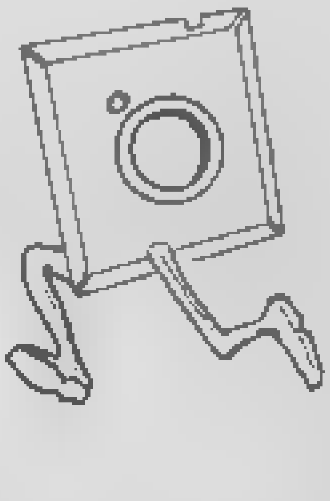


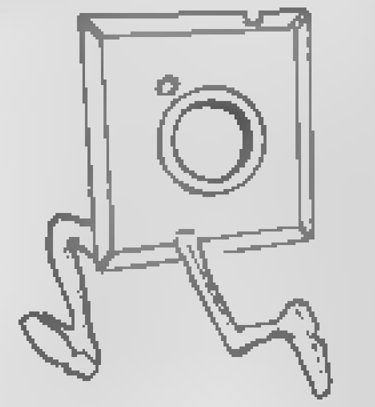


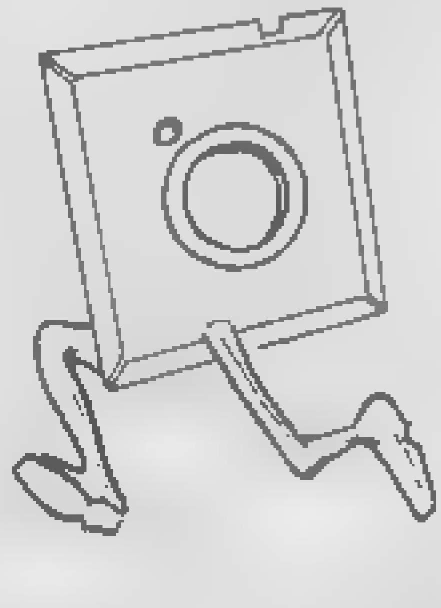
```
0 REM   DISKMAN
1 L=170:E=180:POKE171,0
2 IFPEEK(53247)=1THEN70
3 POKE53247,1
5 PRINT"[CLEAR][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN]
[DOWN][DOWN][RIGHT][RIGHT][RIGHT]
[RIGHT][RIGHT][RIGHT]PLEASE WAIT"
10 POKE56334,PEEK(56334)AND254:POKE1,PEEK(1)AND251
20 FOKR-0TO511:A=PEEK(53248+R):IF(RAND4)=0THENA=INT(A/2)
25 POKE14336+R,A:NEXT
30 POKE1,PEEK(1)OR4:POKE56334,PEEK(56334)OR1
40 POKE53272,(PEEK(53272)AND240)+14
```

```
[illegible] FORR=0TO15:READD:POKE14336+R,D:NEXT
60 FORR=0TO31:READD:POKE14552+R,D:NEXT
65 FORR=0TO31:READD:POKE14616+R,D:NEXT
66 GOSUB200
70 PRINT"[CLEAR][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOW
N][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT]PRESS SPACE BAR TO START"
80 IFPEEK(197)<>60THEN80
90 POKE53272,(PEEK(53272)AND240)+14
100 PRINT"[CLEAR][c 1]";:POKE53280,2:POKE53281,2
111 PRINT"@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
112 PRINT"@@#$AAAAAAAAAAAAAAAAAAAAAAAA@@
113 PRINT"@@[WHITE]%&[c 1]                         @@
114 PRINT"@@                           @@
115 PRINT"@@   @@@   @@@   @@@   @@@   @@ [WHITE]SCORE[c 1]
116 PRINT"@@   @@@   @@@   @@@   @@@   @@ [WHITE]000000[c 1]
117 PRINT"@@   @@@   @@@   @@@   @@@   @@
118 PRINT"@@   AAA   AAA   AAA   AAA   @@
119 PRINT"@@                           @@ [WHITE]LIVES[c 1]
120 PRINT"@@                           @@  [WHITE]00[c 1]
121 PRINT"@@   @@@   @@@   @@@   @@@   @@
122 PRINT"@@   @@@   @@@   @@@   @@@   @@
123 PRINT"@@   @@@   @@@   @@@   @@@   @@ [WHITE]DISKS[c 1]
124 PRINT"@@   @@@   @@@   @@@   @@@   @@  [WHITE]00[c 1]
125 PRINT"@@   AAA   AAA   AAA   AAA   @@
126 PRINT"@@                         - @@ [WHITE]ENERGY[c 1]
127 PRINT"@@                           @@  [WHITE]00[c 1]
128 PRINT"@@   @@@   @@@   @@@   @@@   @@
129 PRINT"@@   @@@   @@@   @@@   @@@   @@ [WHITE]WRITTEN[c 1]
130 PRINT"@@   @@@   @@@   @@@   @@@   @@
131 PRINT"@@   AAA   AAA   AAA   AAA   @@ [WHITE]FOR HCW[c 1]
132 PRINT"@@                         [WHITE][\[c 1]@@
133 PRINT"@@                         [WHITE]]^[c 1]@@ [WHITE]BY[c 1]
134 PRINT"@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@
135 PRINT"AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA [YELLOW]R.BROWN[WHITE]";
199 GOTO300
200 :
240 FORR=12288TO12350:READD:POKER,D:NEXT
241 FORR=12352TO12414:READD:POKER,D:NEXT
242 FORR=12416TO12478:READD:POKER,D:NEXT
243 FORR=12480TO12542:READD:POKER,D:NEXT
244 FORR=12800TO13311:READD:POKER,D:NEXT
245 FORR=0TO64:READD:POKE50176+R,D:NEXT
250 FORR=49152TO49762:READD:POKER,D:NEXT
299 RETURN
300 S=54272:V=53248:POKEV+21,255:POKEV+38,0
301 FORR=0TO24:POKES+R,0:NEXT:POKES+24,15:POKES+1,30:POKES+5,5
302 POKES+10,7:POKES+12,8:POKES+17,5:POKES+19,9
303 POKE181,0:POKE182,1
304 POKE56334,PEEK(56334)AND254:POKE789,193:POKE788,198
305 POKE56334,PEEK(56334)OR1
310 POKEV+28,1:FORR=0TO7:POKEV+39+R,1:POKE2040+R,192:NEXT
314 POKEL,3:POKEE,153
315 FORLI=0TO2
316 POKE2040,204:POKE255,0
320 POKEV,40:POKEV+1,61
321 POKEV+2,230:POKEV+3,61
322 POKEV+4,40:POKEV+5,109
323 POKEV+6,128:POKEV+7,165
324 POKEV+8,200:POKEV+9,213
325 POKEV+10,40:POKEV+11,165
326 POKEV+12,136:POKEV+13,140
327 POKEV+14,232:POKEV+15,200
330 POKE706,1:POKE707,0:POKE708,1:POKE709,0:POKE710,1:POKE711,0
331 POKE712,1:POKE713,0:POKE714,0:POKE715,1:POKE716,0:POKE717,1
332 POKE718,0:POKE719,1
```

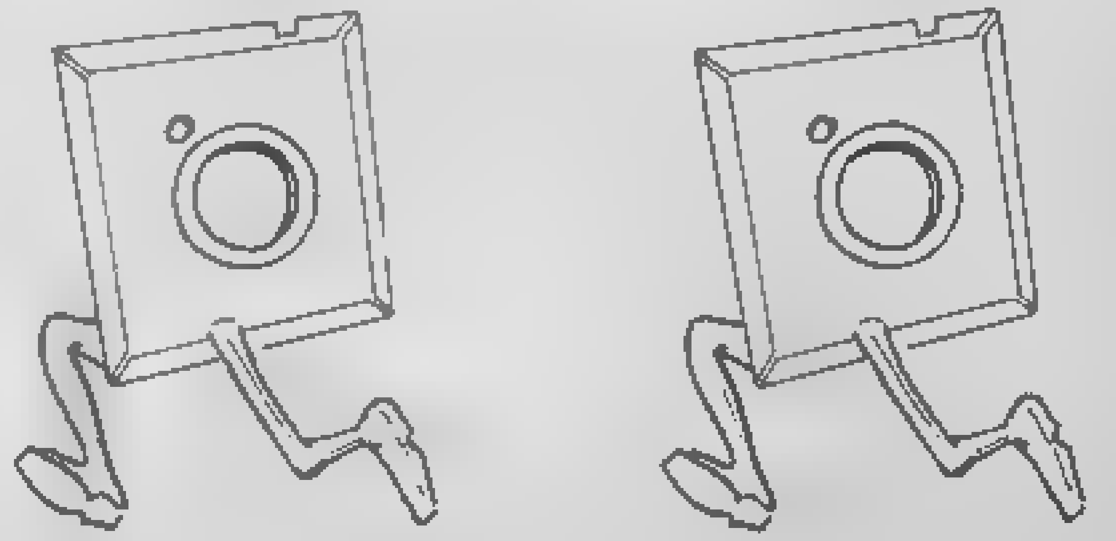




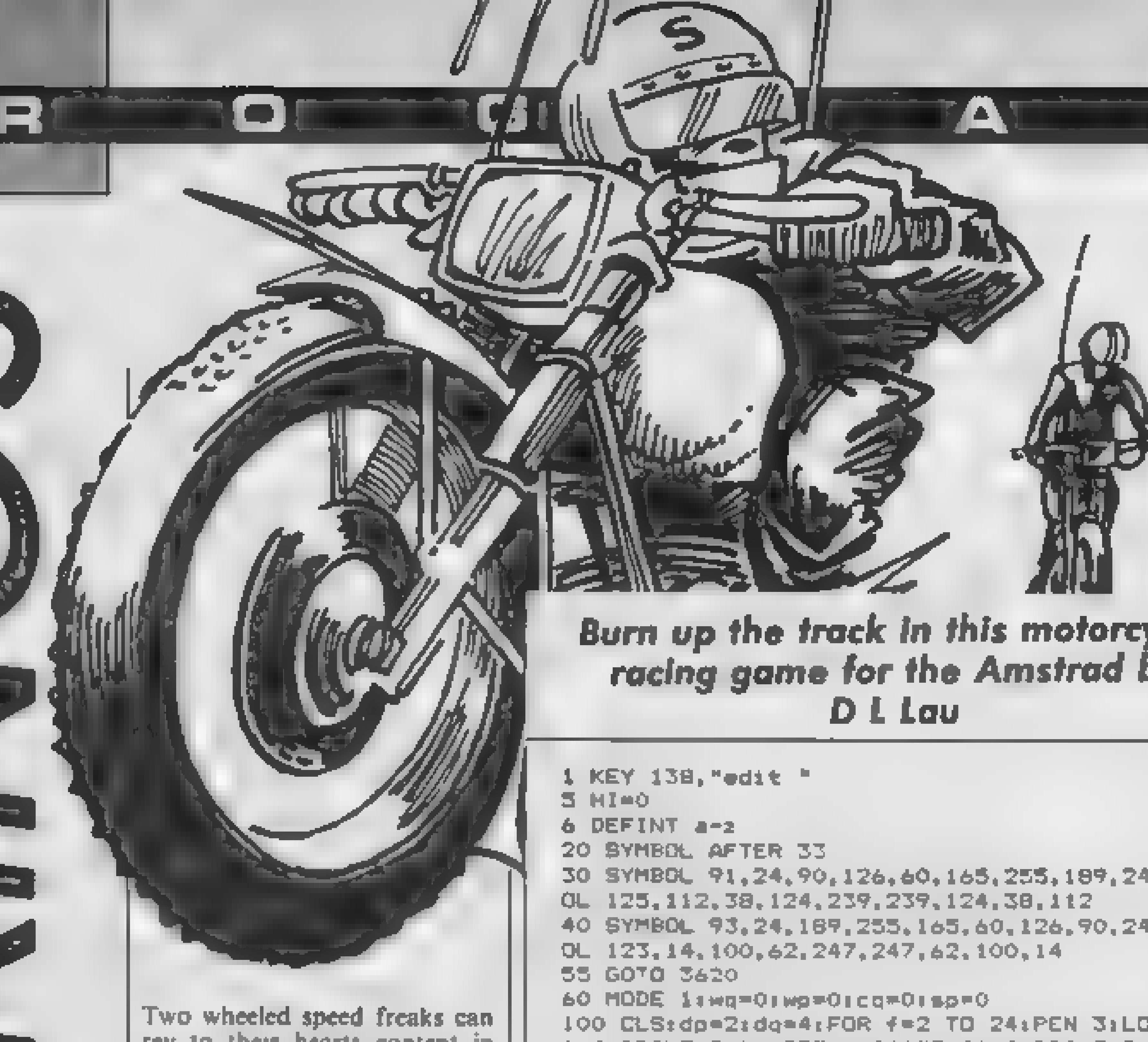




```
340 POKE688,40:POKE689,88:POKE690,136:POKE691,184:POKE692,232:POKE693,0
341 POKE694,0:POKE695,0:POKE696,61:POKE697,109:POKE698,165:POKE699,213
342 POKE700,0:POKE701,0:POKE702,0:POKE703,0
350 SYS 49727
355 FORDL=0TO1000:NEXT
360 POKE E,153:N=PEEK(L)-1:IFN>=0THENPOKEL,N
370 NEXT
[illegible] REM  GAME OVER
405 POKEV+21,0:POKES+24,0
410 FORR=0TO10:PRINT"[DOWN][DOWN][DOWN][DOWN]":NEXT
412 POKE53272,(PEEK(53272)AND240)+5
420 PRINT"[HOME][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOWN][DOW
N][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][
RIGHT][RIGHT][RIGHT]GAME OVER
430 PRINT"[DOWN][DOWN][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT][RIGHT]PRESS SPACE FOR
ANOTHER GO
440 IFPEEK(197)<>60THEN440
450 RESTORE:CLR:RUN
1000 REM  UDG'S
1009 DATA251,251,251,,223,223,223,
1010 DATA251,251,251,,,,,
1011 DATA,31,112,255,128,158,159,155
1012 DATA,254,14,254,30,30,30,158
1013 DATA153,153,155,159,158,128,255,
1014 DATA158,158,158,30,28,24,240,
1015 DATA251,251,251,,4,3,1,1
1016 DATA251,251,251,,96,192,128,128
1017 DATA3,15,27,55,111,111,127,63
1018 DATA128,192,224,240,248,248,248,240
1500 REM SPRITES
1510 DATA,56,,,56,,,56,,,16,,,16,,,16,,,16,,,16,,,16,,112,56,28,127,255,252
1512 DATA112,56,28,,16,,,16,,,16,,,16,,,16,,,16,,,56,,,56,,,56,
1520 DATA,,,7,,,7,,,7,,,2,,,4,,56,4,,60,8,,59,8,,,248,,,56,,,52,,,33,184
1522 DATA,32,120,,64,56,,64,,,128,,1,192,,1,192,,1,192,,,,
1530 DATA,,,,,,28,,,28,,112,28,,112,2,,128,1,1,,,130,,,68,,,56,,,56,,,56,,,68,,
1532 DATA130,,1,1,,2,,128,28,,112,28,,112,28,,,,,,,,
1540 DATA,,,1,192,,1,192,,1,192,,,128,,,64,,,64,56,,32,120,,33,186,,62,,,56,,
1542 DATA248,,59,8,,60,8,,56,4,,,4,,,2,,,7,,,7,,,7,,,,
1550 DATA,255,,3,255,192,63,90,240,2,90,176,10,218,128,42,170
1551 DATA128,42,170,128,,174,,32,248,,32,40,,40,40,55,47
1552 DATA215,250,15,255,254,3,255,254,3,255,192,133,127,240,149,87,240
1553 DATA148,85,88,160,5,88,32,5,72,,,40,255,,255,,3
1554 DATA255,192,63,90,240,2,90,176,10,218,128,42,170,128,42,170,128
1555 DATA,174,,,248,,,40,,,40,,,215,,3,255
1556 DATA192,3,255,192,3,255,192,11,255,224,10,255,160,,95,,9
1557 DATA85,,10,65,128,2,2,128,170,,255,,3,255,192,63,90
1558 DATA240,2,90,176,10,218,128,42
1559 DATA170,128,42,170,128,,174,,,248,,,40,,,40,
1560 DATA,215,,,255,,,255,,,255,,,255,,,215
1561 DATA,,85,,,85,,,20,,,40,,42,,255,
1562 DATA3,255,192,63,90,240,2,90,176,10,218,128,42,170,128,42,170
1563 DATA128,,174,,,248,,,40,,,40,,,215,,3
1564 DATA255,192,3,255,192,3,255,192,11,255,224,10,255,160,,95,
1565 DATA9,85,,10,65,128,2,2,128,2,,255,,3,255,192,15
1566 DATA90,252,13,90,64,1,91,80,1,85,84,1,85,84,,117,
1567 DATA,31,4,,20,4,236,20
1568 DATA20,95,235,244,127,255,240,127,255,192,3,255,192,15,254,161,15
1569 DATA234,169,26,170,41,26,160,5,18,160,4,20,,,255,,255
1570 DATA,3,255,192,15,90,252,13,90,64,1,91,80,1,85,84,1
1571 DATA85,84,,117,,,31,,,20,,,20,,,235,
1572 DATA3,255,192,3,255,192,3,255,192,7,255,208,5,255,80,,250
1573 DATA,,170,144,1,130,80,1,64,64,170,,255,,3,255,192
1574 DATA15,90,252,13,90,64,1.91,80,1,85,84,1,85,84,,117
1575 DATA,,31,,,20,,,20,,,235,,,255,,
1576 DATA255,,,255,,,255,
1577 DATA,235,,,170,,,170,,,40,,,20,,42,
1578 DATA255,,3,255,192,15,90,252,13,90,64,1,91,80,1,85,84
1579 DATA1,85,84,,117,,,31,,,20,,,20,,,235
1580 DATA,3,255,192,3,255,192,3,255,192,7,255,208,5,255,80,
1581 DATA250,,,170,144,1,130,80,1,64,64,2
1582 :
1583 :
[redacted] REM MUSIC DATA
1601 :
1605 DATA5,71,5,71,10,143,5,71,5,71,10,143,5,71,10,143
1610 DATA3,244,3,244,7,233,3,244,3,244,7,233,3,244,7,233
[redacted] DATA4,180,4,180,9,104,4,180,4,180,9,104,4,180,9,104
1630 DATA3,134,3,134,7,12,3,134,3,134,7,12,3,134,7,12,255
1698 :
1699 :
[redacted] REM MACHINE CODE DATA
1701 :
1710 DATA162,7,189,176,2,205,,208,240,6,202,16,245,169,1,96,169
1711 DATA,96,162,7,189,184,2,205,1,208,240,243,202,16,245,48,235
1712 DATA173,,220,133,2,74,176,20,32,,192,208,36,56,173,1,208
1713 DATA233,1,201,60,240,26,141,1,208,208,21,74,176,18,32,,192
1714 DATA208,13,24,173,1,208,105,1,201,214,240,3,141,1,208,165,2
1715 DATA74,74,74,176,20,32,19,192,208,36,56,173,,208,233,1,201
1716 DATA39,240,26,141,,208,208,21,74,176,18,32,19,192,208,13,24
1717 DATA173,,208,105,1,201,233,240,3,141,,208,173,,208,74,74
1718 DATA234,41,3,133,215,173,248,7
1719 DATA41,252,5,215,141,248,7,165,2,41,12,201,12,240,22,201,8
1720 DATA240,19,173,248,7,9,4,141,248,7,169,10,141,37,208,169,1
1721 DATA141,39,208,96,173,248,7,41,251,141,248,7,169,1,141,37,208
1722 DATA169,10,141,39,208,96,24,189,194,2,73,255,105,1,157,194,2
1723 DATA96,162,,24,189,2,208,125,194,2,157,2,208,201,40,240,4
1724 DATA201,232,208,3,32,201,192,232,24,189,2,208,125,194,2,157,2
1725 DATA208,201,61,240,4,201,213,208,3,32,201,192,232,224,14,208,208
1726 DATA96,173,249,7,24,105,1,41,3,9,192,162,,157,249,7,232
1727 DATA224,7,208,248,96,206,254,207
1728 DATA208,8,32,8,193,169,4,141,254,207,96,72,74,74,74,74,24
1729 DATA105,48,32,210,255,104,41,15,24,105,48,76,210,255,248,24,101
1730 DATA167,133,167,165,168,105,,133,168,165,169,105,,133,169,216,162
1731 DATA5,160,32,24,32,240,255,165,169,32,43,193,165,168,32,43,193
1732 DATA165,167,76,43,193,248,56,165,170,233,1,133,170,216,162,9,160
1733 DATA33,24,32,240,255,165,170,76,43,193,248,24,165,171,105,1,133
1734 DATA171,216,162,13,160,33,24,32,240,255,165,171,76,43,193,248,56
1735 DATA165,180,233,1,133,180,216,162,16,160,33,24,32,240,255,165,180
1736 DATA76,43,193,173,30,208,74,176
1737 DATA1,96,32,149,193,162,128,142,4,212,232,142,4,212,165,180,240
1738 DATA1,96,104,104,96,173,28,212,74,234,234,141,15,212,198,182,240
1739 DATA3,76,49,234,169,8,133,182,166,181,189,,196,201,255,208,4
1740 DATA162,,240,245,141,8,212,232,189,,196,141,7,212,232,134,181
1741 DATA162,96,142,11,212,232,142,11,212,76,49,234,173,,208,201,232
1742 DATA240,36,201,40,208,30,173,1,208,201,61,208,23,165,255,240,19
1743 DATA198,255,169,80,32,63,193,32,127,193,162,80,142,18,212,232,142
1744 DATA18,212,96,96,173,1,208,201,213,208,248,165,255,208,244,169,80
1745 DATA32,63,193,230,255,208,225,32
1746 DATA114,193,32,158,193,173,30,208,32,34,192,32,213,192,32,29,193
1747 DATA32,171,193,32,,194,160,8,162,255,202,208,253,136,208,248,240
1748 DATA229
2000 :
[redacted] :
2002 :
2003 :
[redacted] :
2005 :
2006 REM   *****************
2007 REM   ***  DISKMAN  ***
[redacted] REM   *** BY        ***
2009 REM   *** RFA BROWN ***
2010 REM   *****************
```



SPEED KINGS



Burn up the track in this motorcycle racing game for the Amstrad by D L Lau

Two wheeled speed freaks can rev to their hearts content in this raceway arcade simulation. The game can be played as a two hander or you can opt to burn rubber on the computer controlled rider

Variables

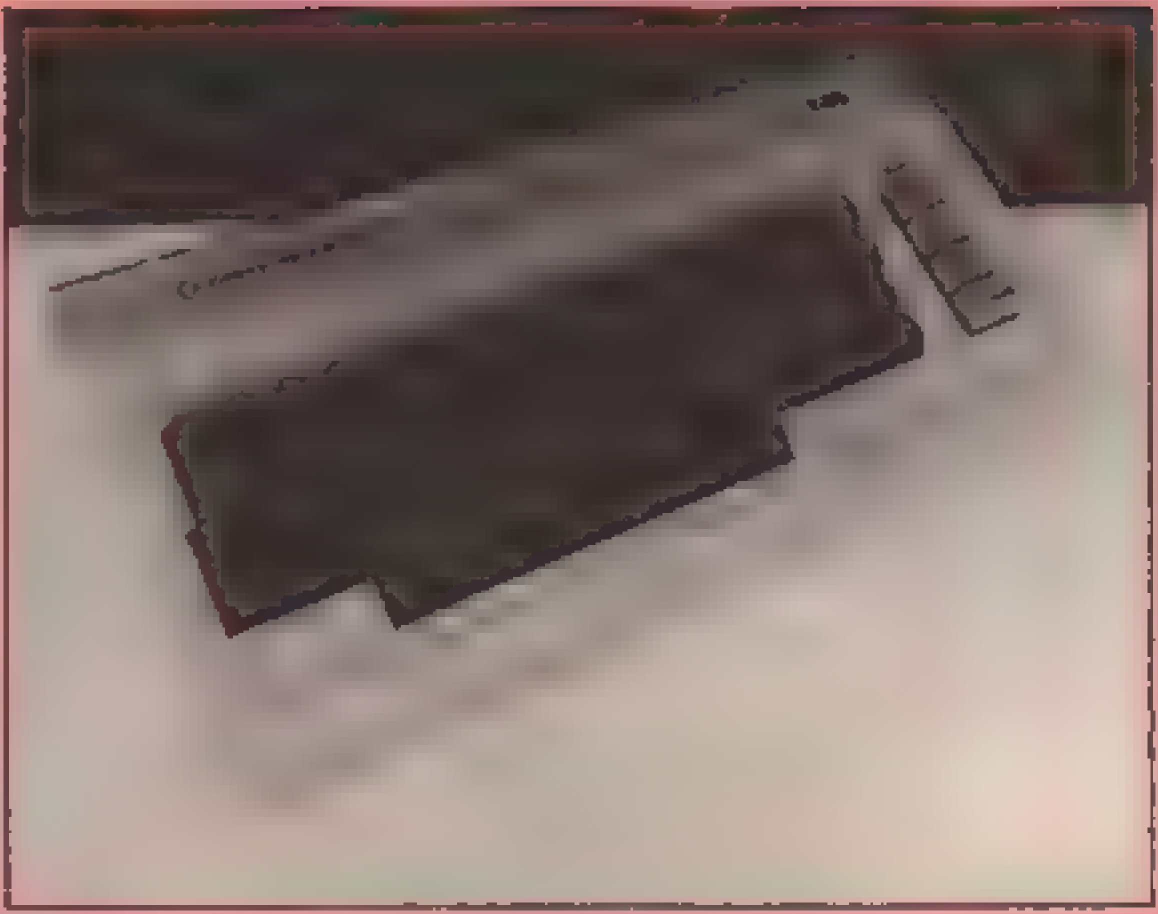
HI	highest score
WQ	number of games won by player 2
WP	number of games won by player 1
CQ	player 2's score
SP	player 1's score
DP	direction of player 1
DQ	direction of player 2
PX,PY	co-ordinates of player 1
QX,QY	co-ordinates of player 2
TI	time
CO	flag, determines if the computer is the opponent
P	bonus score
N$	highest scorer's name

How it works

1-110	initialisation
120-130	print basic screen
140-350	main loop
500-510	up (player 1)
520-530	right
540-550	down
560-570	left
580-590	up (player 2)
600-610	right
620-630	down
640-650	left
670-879	computer movements and checking
3000-3010	routine for player 2's victory
3032-3030	routine for player 1's victory
3500-3620	end of game routine, including entering highest [illegible]
3630-3830	title
4010-4040	printing player 2's characters

```
1 KEY 138,"edit "
5 HI=0
6 DEFINT a-z
20 SYMBOL AFTER 33
30 SYMBOL 91,24,90,126,60,165,255,189,24:SYMB
OL 125,112,38,124,239,239,124,38,112
40 SYMBOL 93,24,189,255,165,60,126,90,24:SYMB
OL 123,14,100,62,247,247,62,100,14
55 GOTO 3620
60 MODE 1:wq=0:wp=0:cq=0:sp=0
100 CLS:dp=2:dq=4:FOR f=2 TO 24:PEN 3:LOCATE
1,f:PRINT CHR$(233):LOCATE 40,f:PRINT CHR$(23
3):NEXT:LOCATE 2,2:PRINT STRING$(38,CHR$(233)
):LOCATE 2,24:PRINT STRING$(38,CHR$(233))
105 INK 3,18:INK 0,0:INK 1,26:INK 2,20:BORDER
 0
110 px=6:py=13:qx=35:qy=13:ti=0
120 PEN 2:LOCATE 3,1:PRINT"PLAYER 1:";:PEN 1:
PRINT wp:PEN 2:LOCATE 16,1:PRINT"PLAYER 2:";:
PEN 1:PRINT wq:PEN 2:LOCATE 29,1:PRINT"TIME:"
;ti
130 PAPER 0:PEN 1:LOCATE px,py:PRINT"}":LOCAT
E q .qy:PEN 2:PRINT"{"
140 ti=ti+1:PEN 1:LOCATE 34,1:PRINT ti
150 SOUND 1,150,10,4,0,0,5
160 IF INKEY(69)=0 THEN dp=1
170 IF INKEY(61)=0 THEN dp=2
180 IF INKEY(71)=0 THEN dp=3
190 IF INKEY(60)=0 THEN dp=4
200 PEN 1:ON dp GOSUB 500,520,540,560
240 IF co=1 THEN PEN 2:ON dq GOTO 670,730,790
,840
[illegible] IF INKEY(13)=0 THEN dq=1
260 IF INKEY(5)=0 THEN dq=2
270 IF INKEY(15)=0 THEN dq=3
280 IF INKEY(14)=0 THEN dq=4
290 PEN 2:ON dq GOSUB 580,600,620,640
350 GOTO 140
500 LOCATE px,py:PRINT"[":IF TEST(px*16-10,(2
6-py)*16+10)<>0 THEN 3000
510 py=py-1:LOCATE px,py+1:PRINT CHR$(143):LO
CATE px,py:PRINT"[":RETURN
520 LOCATE px,py:PRINT"}":IF TEST((px+1)*16-1
2,(26-py)*16-10)<>0 THEN 3000
530 px=px+1:LOCATE px-1,py:PRINT CHR$(143):LO
CATE px,py:PRINT"}":RETURN
540 LOCATE px,py:PRINT"]":IF TEST(px*16-6,(25
-py)*16-10)<>0 THEN 3000
550 py=py+1:LOCATE px,py-1:PRINT CHR$(143):LO
CATE px,py:PRINT"]":RETURN
560 LOCATE px,py:PRINT"{":IF TEST((px-1)*16-6
,(26-py)*16-6)<>0 THEN 3000
570 px=px-1:LOCATE px+1,py:PRINT CHR$(143):LO
CATE px,py:PRINT"{":RETURN
575 '***********************************
580 LOCATE qx,qy:PRINT"[":IF TEST(qx*16-10,(2
6-qy)*16+10)<>0 THEN 3020
590 qy=qy-1:LOCATE qx,qy+1:PRINT CHR$(143):LO
CATE qx,qy:PRINT"[":RETURN
600 LOCATE qx,qy:PRINT"}":IF TEST((qx+1)*16-1
2,(26-qy)*16-10)<>0 THEN 3020
610 qx=qx+1:LOCATE qx-1,qy:PRINT CHR$(143):LO
CATE qx,qy:PRINT"}":RETURN
620 LOCATE qx,qy:PRINT"]":IF TEST(qx*16-6,(25
-qy)*16-10)<>0 THEN 3020
630 qy=qy+1:LOCATE qx,qy-1:PRINT CHR$(143):LO
CATE qx,qy:PRINT"]":RETURN
640 LOCATE qx,qy:PRINT"{":IF TEST((qx-1)*16-6
,(26-qy)*16-6)<>0 THEN 3020
650 qx=qx-1:LOCATE qx+1,qy:PRINT CHR$(143):LO
CATE qx,qy:PRINT"{":RETURN
660 '**********: computer *************
670 IF INT(RND*16)=2 AND INT(RND*2)=0 AND TES
T((qx+1)*16-12,(26-qy)*16-10)=0 THEN dq=2 ELS
E IF INT(RND*16)=2 AND INT(RND*2)=0 AND TEST(
(qx-1)*16-6,(26-qy)*16-6)=0 THEN dq=4
680 ON dq GOTO 690,4020,4030,4040
690 LOCATE qx,qy:PRINT"[":IF TEST(qx*16-10,(2
6-qy)*16+10)=0 THEN 4010
700 IF TEST((qx+1)*16-12,(26-qy)*16-10)=0 THE
N dq=2:GOTO 4020
710 IF TEST((qx-1)*16-6,(26-qy)*16-6)=0 THEN
dq=4:GOTO 4040
720 GOTO 3020
730 IF INT(RND*16)=2 AND INT(RND*2)=0 AND TES
T(qx*16-10,(26-qy)*16+10)=0 THEN dq=1 ELSE IF
 INT(RND*16)=2 AND INT(RND*2)=0 AND TEST(qx*1
6-6,(25-qy)*16-10)=0 THEN dq=3
740 ON dq GOTO 4010,750,4030,4040
750 LOCATE qx,qy:PRINT"}":IF TEST((qx+1)*16-1
2,(26-qy)*16-10)=0 THEN 4020
760 IF TEST(qx*16-10,(26-qy)*16+10)=0 THEN dq
=1:GOTO 4010
770 IF TEST(qx*16-6,(25-qy)*16-10)=0 THEN dq=
3:GOTO 4030
780 GOTO 3020
785 '*****************    *************
790 IF INT(RND*16)=2 AND INT(RND*2)=0 AND TES
T(qx*16-10,(26-qy)*16+10)=0 THEN dq=2 ELSE IF
 INT(RND*16)=2 AND INT(RND*2)=0 AND TEST((qx-
1)*16-6,(26-qy)*16-6)=0 THEN dq=4
800 ON dq GOTO 4010,4020,810,4040
810 LOCATE qx,qy:PRINT"]":IF TEST(qx*16-6,(25
-qy)*16-10)=0 THEN 4030
820 GOTO 700
840 IF INT(RND*16)=2 AND INT(RND*2)=0 AND TES
T(qx*16-10,(26-qy)*16+10)=0 THEN dq=1 ELSE IF
 INT(RND*16)=2 AND INT(RND*2)=0 AND TEST(qx*1
6-6,(25-qy)*16-10)=0 THEN dq=3
850 ON dq GOTO 4010,4020,4030,860
860 LOCATE qx,qy:PRINT"{":IF TEST((qx-1)*16-6
,(26-qy)*16-6)=0 THEN 4040
870 GOTO 760
3000 INK 1,24,6:ENT 1,30,2,2:FOR f=1 TO 10:SO
UND 1,f*2,30,INT((80-f)/15),0,1,1:NEXT
3005 TAG:FOR f=640 TO -300 STEP -8:SOUND 1,10
0,5,4,0,0,1:MOVE F,398:PRINT"{=GAME TO PLAYER
 2 ";:NEXT:TAGOFF
3006 wq=wq+1:IF wq=3 THEN 3500
3010 INK 1,26:LOCATE 14,1:PEN 2:PRINT"BONUS S
CORE:";:PEN 1:P=INT(INT(RND*50)+TI/2):PRINT P
:CQ=CQ+P:FOR F=1 TO 1050:NEXT:GOTO 100
3020 INK 2,20,1:ENT 1,30,2,2:FOR f=1 TO 10:SO
UND 1,f*2,30,INT((80-f)/15),0,1,1:NEXT
3025 TAG:FOR f=640 TO -300 STEP -8:SOUND 1,10
0,5,4,0,0,1:MOVE f,398:PRINT"{=GAME TO PLAYER
 1 ";:NEXT:TAGOFF
3026 wp=wp+1:IF wp=3 THEN 3500
3030 INK 2,20:LOCATE 14,1:PEN 1:PRINT"BONUS S
CORE:";:PEN 2:P=INT(INT(RND*50)+(TI/2)):PRINT
 P:SP=SP+P:FOR F=1 TO 1050:NEXT: GOTO 100
3500 FOR f=1 TO 13:SOUND 1,(20-f)*3,10,INT((1
8-f)/3):INK 1,f:PEN 1:LOCATE 1,f:PRINT STRING
$(40,CHR$(143)):LOCATE 1,25-f:PRINT STRING$(4
0,CHR$(143)):NEXT:INK 1,24
3510 CLS:INK 1,26:PEN 1:LOCATE 3,5:PRINT"PLAY
ER 1:WON";WP;"GAMES AND SCORED",SP
3520 INK 2,20: PRINT:PRINT:PEN 2:PRINT"   PLAY
ER 2:WON";WQ;"GAMES AND SCORED :CQ
3524 IF (sp>cq AND sp>hi) OR(cq>hi AND co=0)T
HEN 3530
3525 IF co=1 OR sp<hi OR cq<hi THEN 3600
3530 n$="": PRINT:PRINT:PRINT:PEN 3:IF SP>CQ
THEN PRINT"  * PLAYER 1 PLEASE ENTER YOUR NAM
E *":HI=SP ELSE IF SP<CQ THEN PRINT"  * PLAYE
R 2 PLEASE ENTER YOUR NAME *":HI=CQ
3540 LOCATE 11,16:PRINT STRING$(20,CHR$(208))
3550 FOR f=1 TO 100:z$=INKEY$:NEXT:z$="":FOR
F=11 TO 30
3555 z$=INKEY$:IF z$=""THEN 3555
3556 SOUND 1,50,10,4:IF ASC(z$)=13 AND n$<>""
THEN 3600 ELSE IF ASC(z$)=13 AND n$=""THEN 35
55
3560 n$=n$+UPPER$(z$):PEN 2:LOCATE f,15:PRINT
 UPPER$(z$)
3570 NEXT
3600 IF co=1 AND cq>hi THEN n$="AMSTRAD CPC 4
64":HI=CQ
3610 PRINT:PRINT:PEN 3:PRINT"HI SCORE IS";HI;
"BY "N$
3620 INK 3,18:INK 0,0:INK 1,26:INK 2,20:BORDE
R 0:FOR f=1 TO 2000:NEXT:FOR f=1 TO 25:LOCATE
 1,25:PRINT CHR$(10):NEXT
3630 CLS:PEN 3:PRINT:PRINT"              *+*
TRON *+*"
3640 PRINT:PRINT:PEN 2:PRINT"This game involv
es 2 players.Each playerdriving a laser car a
nd both competes   against each other."
3650 PEN 1:PRINT:PRINT"The cars will leave a
trail of laser    beam and both cars mustn't
crash into anything in front of them as they
go along"
3660 PEN 3:PRINT:PRINT"The idea of the game i
s that you must   force your opponent so that
 he crashes  before you do'"
3670 PEN 2:PRINT:PRINT"The whole game ends wh
en a player wins 3 games."
3680 PEN 1:PRINT:PRINT"BUT this doesn't mean
he has won because it is points which counts"
3690 PEN 3:PRINT:PRINT"       *** PRESS 'C' TO
 CONTINUE ***
3700 IF UPPER$(INKEY$)<>"C"THEN 3700
3710 FOR f=1 TO 25:LOCATE 1,1:PRINT CHR$(11):
NEXT:CLS
3720 PRINT:PRINT"The longer you stay alive be
fore your   opponent dies the more points you
'll get.You'll only get points if you're aliv
e."
3730 PEN 1:PRINT:PRINT"In others words the pl
ayer who wins the game gets points."
3735 PRINT:PEN 3:PRINT"   KEYS:"
3740 PEN 2:PRINT:PRINT"   PLAYER 1:A-UP,Z-DOW
N,D-RIGHT,S-LEFT"
3750 PRINT:PRINT"   PLAYER 2:1-UP,0-DOWN,3-RI
GHT,2-LEFT"
3770 PEN 1:PRINT:PRINT"If you can't find anot
her person to playwith then you can play agai
nst the       computer in which case you'll be
 player 1"
3780 PEN 3:PRINT:PRINT"   PRESS 'C' to play a
gainst computer                 otherwise 'P'
"
3790 IF UPPER$(INKEY$)="C"THEN co=1 :GOTO 381
0 ELSE IF UPPER$(INKEY$)="P"THEN co=0:GOTO 38
10
3800 GOTO 3790
3810 PEN 2:PRINT:PRINT"        *+*  PRESS 'M'
TO PLAY *+*"
3820 IF UPPER$(INKEY$)<>"M"THEN 3820
3830 GOTO 60
3999 END
4000 '***********************************
4010 LOCATE qx,qy:PRINT"[":qy=qy-1:LOCATE qx,
qy+1:PRINT CHR$(143):LOCATE qx,qy:PRINT"[":GO
TO 350
4020 LOCATE qx,qy:PRINT"}":qx=qx+1:LOCATE qx-
1,qy:PRINT CHR$(143):LOCATE qx,qy:PRINT"}":GO
TO 350
4030 LOCATE qx,qy:PRINT"]":qy=qy+1:LOCATE qx,
qy-1:PRINT CHR$(143):LOCATE qx,qy:PRINT"]":GO
TO 350
4040 LOCATE qx,qy:PRINT"{":qx=qx-1:LOCATE qx+
1,qy:PRINT CHR$(143):LOCATE qx,qy:PRINT"{":GO
TO 350
```

BRIGHT SPRITES



More tips on persuading your sprites to spring into life in part four of Andrew Clarke's programming series for the C64

Animation is possibly one of the most feared aspects of character designing and therefore most games published in magazines feature a main character that whizzes around the screen but does not move one spritely muscle. These static characters are unimpressive and take away any impact that a game might have.

Animating sprites is fairly easy to do. The hardest part is creating the sprite pictures — the "frames" you will use. Once that is done then the rest is... well, easier! The process works in much the same way as a flick cartoon, where pictures are displayed one at a time and are drawn so as to deceive the eye into thinking it is watching actual movement.

With sprites you can keep it very simple or go into great detail. One of the best examples of walking animation on a sprite is in Ultimate's Staff Of Karnath. The main character moves so smoothly that at least eight sprite pictures must be used to create the illusion (and that is only in one direction)

We don't need to go to such lengths. Two frames might just suffice to get a walking action, although it won't be too realistic. Before we go any further it has to be said that animation is not just restricted to little men running about. Think of the aeroplanes in Beach Head and Dambusters as they zoom in at you. The same principle of "frames" is used there — first a small plane then one slightly larger and so on until you reach full size.

What sort of routine do you use for the demise of your plane? The following program will show you a rather spectacular way. Pressing the cursor keys before the ship explodes will show you another possible use of animation.

What happens here is that six frames (or six lots of sprite data) are used. Here is a rundown

1:	ship normal	data block 200
2	ship banking	data block 201
3:	explosion pt1	data block 202
4:	explosion pt2	data block 203
5:	explosion pt3	data block 204
6:	explosion pt4	data block 205

The ship is originally brought on as Frame 1. Pressing the cursor DOWN key puts in Frame 2 by switching the sprite pointer (location 2040) from data block 200 to 201. Pressing cursor Right reverts back to Frame 1 (data block 200).

When it reaches a certain point on the screen the ship explodes. The sprite pointer is told to switch through blocks 202 to 205, only pausing to execute a delay FOR...NEXT loop. The sprites at 202 to 205 are defined in such a way as to appear to be an expanding field of particles — dense at first, then thinning out

Here we used a FOR NEXT loop to control the sprite data but this won't be much use when trying to use a "walk" routine To account for random user input we must use a variable which can be POKEd into the sprite pointer location and can be incremented or decreased as we did with sprite movement in article two.

Let us say that the three sprites used in a walk sequence are at blocks 200 to 202 and for moving right they are at 203 to 205 (six "frames" in all). If the variable is called Z, then for walking left Z will first equal 200 then 201 and finally 202 This sequence may be repeated depending on how you have arranged the data. You may find it best to go straight back to 200 or go back through 201 then down to 200 (and then back up again).

Each time Z is increased or decreased you must use IF... THEN statements to check its status, so that it doesn't go over 202 or below 200 Once checked you can POKE the value into location 2040 for sprite zero, or 2041 for sprite one and so on.

When the player changes direction then Z must be made to equal 203 for moving right and a similar process is repeated. A small routine to change Z might be GOSUBed and could look like this.

```
1000 IFZ=200THENZ=201:
     RETURN
1002 IFZ=201THENZ=202:
     RETURN
1004 IFZ=202THENZ=200:
     RETURN
```

A similar routine is needed for moving right.

The main program will access these statements through the user input. For example, if you use a joystick and push left then make a variable, say, A equals 1. If it goes right then A will equal 2 and if there is no joystick command then A equals zero.

Then within the main program another routine would say IF A=1THENGOSUB1000 and if it equals two then another routine would send it to the appropriate subroutine. For zero (no movement) it does nothing — this stops the character appearing to "run on the spot."

This all seems fine. If the joystick moves left then A will equal one and you should GOSUB the routine at lines 1000 to 1004. But how does the computer know what Z equals?

At the start of a program you may make Z equal an appropriate value but it is of no use here. Think about it. After the IF...THEN statement which analyses the joystick input you have A=1:Z=200. Okay?..... Wrong!!!!!

With a statement like that each time you push the stick left Z will be made equal to 200. Therefore the routine at lines 1000 to 1004 is wasted. To rectify the problem you need something that will make Z = 200 only when the joystick is first pushed left. Afterwards it must be ignored. The good old IF...THEN statement comes to the rescue.

The way to stop it is to use this after getting the user input and making A = 1.

IF Z > 202THENZ = 200 (or for the other way)
IF Z < 203THENZ = 201

What this does (taking the first example) is to say that if Z is larger than 202 — therefore the character was previously facing right — make it equal 200, that is the first "frame" in the left facing walking sequence.

But if it isn't larger than 202 it is already facing left and you shouldn't make it equal 200 again. That may sound complicated but try a similar routine yourself and you'll see how these methods solve the problems which you encounter.

The design of a sequence is also easier than you may have thought. Artists may have an advantage here but we mere mortals get there in the end.

First design your "master" sprite character. This will be the character in normal pose — in the case of a little man he will probably be facing left with his feet together

Then design a sprite that is identical to the first. Now adjust it so that a leg is moved or an arm is swung out. Design a third identical to the second then alter this so that another step in the animation sequence is completed. Continue this process for as many as you need. It helps if, in a walking sequence, the last picture has a natural progression back to the first so that if required they could be run in a FOR...NEXT loop endlessly.

Now you need a set for facing the other way and for jumping, climbing, dying and falling. (Some sprite editors allow you to "mirror" previously created sprites. The less fortunate amongst us have to slog it out).

Finally I will leave you with a program that shows three different pieces of animation. One shows a mind boggling series of three squares. The next uses just two sprites to make a dog seem to run (this is from my GOLF program in HCW issue 105). The last one also uses just two sprites to show a hovering fly. The golden rule here is keep it simple.

Excuse the large amount of data to type in — that's one of the perils of animation. More next time in the final part of my series. Then I'll be telling you how to deal with the sprite collision detection registers.

```
0 REM **** PROGRAM ONE
1 REM **** AN EXPLOSION IN SPACE
9 REM **** READ IN DATA
10 FORS=200TO205:FORT=0TO62
12 READA:POKES*64+T,A:NEXT:NEXT
13 REM *** SET UP SPRITE ZERO + SCREEN
14 V=53248:PRINT"J" POKEV+29.0
16 POKEV+32,0:POKEV+33.0
18 POKE2040,200:POKEV+21,1
20 POKEV+1,150:POKEV+39,1
21 REM *** MOVE SPRITE
22 FORX=0TO250STEP.5
24 POKEV,X
25 REM *** CHECK FOR USER INPUT
26 GETA$:IFA$=""THEN32
28 IFA$="▶▌"THENPOKE2040,200
30 IFA$="▐▌"THENPOKE2040,201
32 NEXT
33 REM *** EXPAND AND EXPLODE SHIP
34 POKEV+29,1
36 FORZ=202TO205:POKE2040,Z
38 FORT=1TO200:NEXT:NEXT
39 REM *** ANOTHER GO?
40 PRINT"JQQQQ▶▶▶AGAIN? (Y/N)"
42 GETD$
44 IFD$="Y"THENRUN14
46 GOTO42
99 REM ****** SHIP 1
100 DATA0,0,0,128,0,0,192,0
102 DATA0,224,0,0,112,0,56,120
104 DATA0,68,92,0,130,78,121,1
106 DATA79,255,207,79,255,255,78,236
108 DATA120,92,184,32,120,240,0,115
110 DATA224,0,224,0,0,192,0,0
112 DATA128,0,0,0,0,0,0,0
114 DATA0,0,0,0,0,0,0
115 REM ****** SHIP 1
116 DATA15,128,0,129,192,0,192,224
118 DATA0,224,224,56,240,184,68,88
120 DATA222,130,76,239,1,79,255,199
122 DATA79,255,255,76,238,248,88,220
124 DATA96,240,184,0,224,224,0,192
126 DATA224,0,129,192,0,15,128,0
128 DATA0,0,0,0,0,0,0,0
130 DATA0,0,0,0,0,0,0
131 REM ****** EXPLOSION 1
132 DATA4,2,0,66,4,8,33,8
134 DATA16,16,0,32,2,34,0,33
136 DATA36,16,16,168,32,8,112,64
138 DATA3,255,0,8,112,64,16,168
140 DATA32,33,36,16,2,34,0,16
142 DATA0,32,32,0,16,65,2,8
144 DATA2,1,0,4,0,128,0,0
146 DATA0,0,0,0,0,0,0
147 REM ****** EXPLOSION 2
148 DATA129,0,17,64,0,2,32,16
150 DATA4,16,0,8,8,129,16,128
152 DATA66,0,8,36,16,4,0,32
154 DATA2,68,66,1,0,128,136,0
156 DATA16,1,0,128,2,16,64,4
158 DATA68,34,8,130,16,129,17,0
160 DATA8,0,16,16,0,8,40,64
162 DATA68,64,0,2,128,4,1
163 REM ****** EXPLOSION 3
164 DATA4,16,8,0,0,0,0,0
166 DATA0,4,0,0,0,1,1,0
168 DATA0,0,128,132,0,0,0,16
170 DATA0,0,0,0,0,0,0,1
172 DATA0,4,32,1,0,0,0,0
174 DATA4,0,0,0,0,128,0,16
176 DATA0,128,0,0,0,1,0,0
178 DATA0,0,0,0,128,129,4
179 REM ****** EXPLOSION 4
180 DATA0,8,2,0,0,0,0,0
182 DATA0,8,0,16,0,0,0,0
184 DATA0,0,0,0,0,0,0,0
186 DATA0,0,0,0,0,0,0,0
188 DATA0,0,0,32,0,0,0,0
190 DATA0,0,0,0,0,2,0,0
192 DATA0,0,0,0,0,0,0,0
194 DATA0,0,0,0,128,0,16
```

```
0 REM **** PROGRAM TWO
1 REM **** EXAMPLES OF ANIMATION
9 REM **** READ IN SPRITE DATA
10 FORS=200TO206:FORT=0TO62
12 READA:POKES*64+T,A:NEXT:NEXT
13 REM *** SET UP SCREEN AND MENU
14 V=53248:PRINT"J"
16 POKEV+33,0:POKEV+32,0
18 PRINT"■QQ▶▶▶▶▶▶▶▶▶▶MENU"
```

```
20 PRINT"π■■■■■■■■■■■▌─────"
22 PRINT"■■■■■■■PRESS KEY (1 - 3)■"
24 PRINT"■■■■■1).  ■THE EYE BOGGLER"
26 PRINT"π■■■■■■2).   ■MAD DOG"
28 PRINT"π■■■■■■3).   ■THE FLY"
30 GETA$:IFA$=""THEN30
32 IFA$= 1"THENGOTO40
34 IFA$="2"THENGOTO60
36 IFA$="3"THENGOTO74
38 GOTO30
39 REM *** THE EYE BOGGLER
40 PRINT"♫":POKEV+1,130:POKEV,150
42 POKEV+28,0 POKEV+29,1:POKEV+23,1
44 POKEV+39,1:POKEV+21,1
46 FORS=1TO20
48 FORZ=200TO202:POKE2040,Z
50 FORT=1TO100:NEXT:NEXT
52 NEXT:POKEV+21,0:GOTO14
59 REM *** MAD DOG
60 PRINT"♫":POKEV+1,130:POKEV,150
62 POKEV+28,1:POKEV+29,1:POKEV+23,1
64 POKEV+39,6:POKEV+21,1:POKEV+37,7
66 FORT=1TO20:FORZ=203TO204
68 POKE2040,Z:FORD=1TO100
70 NEXT:NEXT:NEXT
72 POKEV+21,0:GOTO14
73 REM *** THE FLY
74 PRINT"♫":POKEV+1,130:POKEV,150
76 POKEV+28,1:POKEV+29,0:POKEV+23,0
78 POKEV+39,14:POKEV+21,1:POKEV+38,7
80 POKEV+37,2 FORD=1TO30
82 POKE2040,205:FORT=1TO100:NEXT
84 POKE2040,206:FORT=1TO100 NEXT:NEXT
86 POKEV+21,0 GOTO14
99 REM *** SPRITE DATA
100 DATA255,255,255,128,0,1,128,0
102 DATA1,159,255,249,144,0,9,144
104 DATA0,9,147,255,201,146,0,73
106 DATA146,0,73,146,126,73,146,66
108 DATA73,146,126,73,146,0,73,146
110 DATA0,73,147,255,201,144,0,9
112 DATA144,0,9,159,255,249,128,0
114 DATA1,128,0,1,255,255,255
115 REM ********
116 DATA0,0,0,127,255,254,64,0
118 DATA2,64,0,2,79,255,242,72
120 DATA0,18,72,0,18,73,255,146
122 DATA73,0,146,73,0,146,73,60
124 DATA146,73,0,146,73,0,146,73
126 DATA255,146,72,0,18,72,0,18
128 DATA79,255,242,64,0,2,64,0
130 DATA2,127,255,254,0,0,0
131 REM ********
132 DATA0,0,0,0,0,0,63,255
134 DATA252,32,0,4,32,0,4,39
136 DATA255,228,36,0,36,36,0,36
138 DATA36,255,36,36,129,36,36,129
140 DATA36,36,129,36,36,255,36,36
142 DATA0,36,36,0,36,39,255,228
144 DATA32,0,4,32,0,4,63,255
146 DATA252,0,0,0,0,0,0
147 REM ********
148 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0
150 DATA0,0,64,16,1,0,80,4,0,84,5,85,85
152 DATA21,85,84,21,85,64,80,0,80,64,0
154 DATA20,0,0,0,128,0,40,160,0,160,42
156 DATA170,170,2,170,160,0,0
158 DATA160,0,0,32,0,0,0
159 REM ********
160 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0
162 DATA0,64,0,16,16,0,80,4,0,84,5,85
164 DATA85,5,85,84,5,85,64,1,65,64,0
166 DATA69,0,0,0,0,2,138,0,10,2,128
168 DATA10,170,170,2,170,160,0,0
170 DATA160,0,0,32,0,0,0
173 REM ********
174 DATA0,0,0,80,0,0,21,0,0,21,64,0,5
176 DATA80,0,1,80,2,9,84,10,42,86,40
178 DATA170,170,164,170,170,168,186
180 DATA235,168,58,235,32,240,195,0,3
182 DATA207,0,0,0,0,0,0,0,0,0,0,0,0,0
184 DATA0,0,0,0,0,0,0,0
185 REM ********
186 DATR0,0,0,0,0,0,0,0,0,0,0,0,0,0
188 DATA0,0,0,2,10,40,10,42,86,40,169
190 DATA86,164,169,90,168,181,91,168
192 DATA21,107,32,213,195,0,83,207,0,0
194 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
196 DATA0,0,0,0
197 REM ******** END
```

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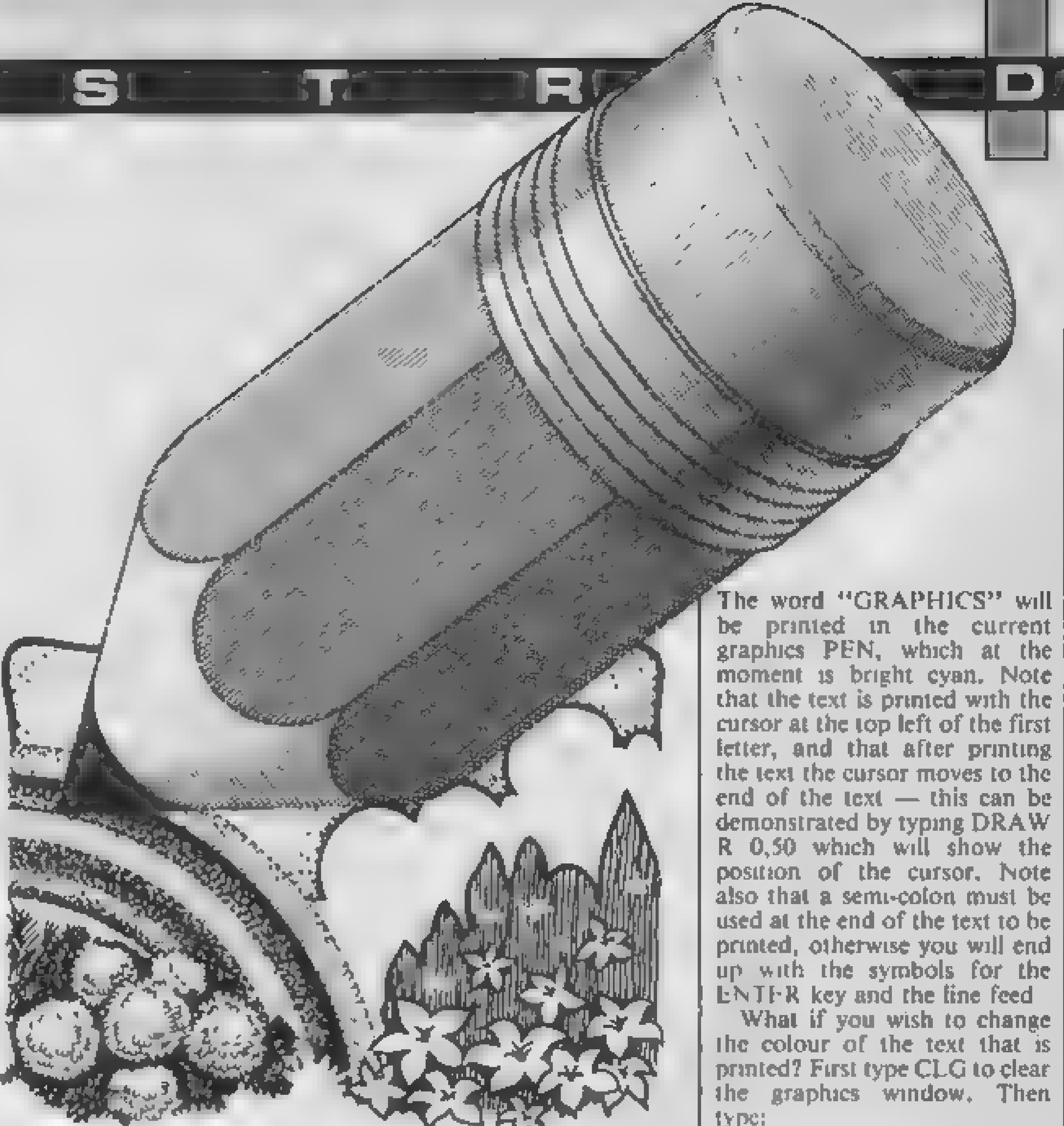


Red and Yellow and Pink and Green, Orange and Purple and Blue, we can draw a rainbow and so can you! Dave Ellis continues his game writing tips

In the first article we looked at colours in the text mode The same colours that are used for the text are also used for the graphics, the number of colours available depending upon the current MODE

You may be interested to know that it is possible to **double** the number of PENS available in each mode by using software interrupts on the frame flyback. The screen and the border area can be split and have two different colour pallettes. The technique is too complex to discuss in more detail here — but it can be done. Next time you see a MODE 1 screen displaying eight different colours for example, you'll know why!

To experiment with the graphics colours, first reset the machine and then set up two windows with

```
WINDOW # 0,1,17,1,25
ORIGIN 320,200,320,640,400,
        200
```

Now clear the text window to BRIGHT RED with

```
PAPER 3 : CLS
```

The smaller graphics window is cleared to BRIGHT RED by:

```
CLG 3
```

To select a PEN for drawing a line, the PEN number is added to the end of the drawing co-ordinates To draw a line in bright cyan (PEN 2) you would say:

```
DRAW 100,100,2
```

This will draw a line from the current graphics cursor (at 320,200 to the co-ordinates 320 = 100, and 200 = 100. In effect, the lower left hand corner of the graphics window should be thought of as being 0,0.

Now, if you wish to print some text at the graphics cursor use the TAG command so:

```
TAG : PRINT "GRAPHICS";
```

The word "GRAPHICS" will be printed in the current graphics PEN, which at the moment is bright cyan. Note that the text is printed with the cursor at the top left of the first letter, and that after printing the text the cursor moves to the end of the text — this can be demonstrated by typing DRAW R 0,50 which will show the position of the cursor. Note also that a semi-colon must be used at the end of the text to be printed, otherwise you will end up with the symbols for the ENTER key and the line feed

What if you wish to change the colour of the text that is printed? First type CLG to clear the graphics window. Then type:

```
ORIGIN 320,300 : TAG :
    PRINT "ONE";
```

"ONE" will be printed in bright cyan. Now enter:

```
DRAWR 0,0,1 : TAG : PRINT
    "TWO";
```

DRAWR 0,0,1 sets the PEN to 1 (bright yellow). The single pixel that is drawn will disappear when the word "TWO" is drawn.

This is one way of changing the colours of text printed at the graphics cursor. There are other methods, one via machine code as shown in my RSX series and another by using a POKE which will be looked at shortly

Setting the background PAPER of the graphics window is not so easy, unless you just wish to clear the whole screen as shown earlier. One method is to create a graphics window outside of the normal range, clear it with the background colour required, and then reset the graphics window back to its previous setting. The difficulty here is that a small pixel of colour is displayed at the extreme corner of the screen so this method is not really very satisfactory.

Fortunately, there is a simple method of setting both the PEN and PAPER for the graphics

PEN	MODE 2	MODE 1	MODE 0
0	0	0	0
1	255	240	192
2	0	15	12
3	255	255	204
4	0	0	48
5	255	240	240
6	0	15	60
7	255	255	252
8	0	0	3
9	255	240	195
10	0	15	15
11	255	255	207
12	0	0	51
13	255	240	243
14	0	15	63
15	255	255	255

DEFAULT INK VALUES for &B339

screen from BASIC by using some POKEs. This also has the advantage of allowing some unusual colour mixes which are not easily obtained by other [illegible]

The present settings for the Graphics PEN and PAPER are held at locations &B338 and &B339 respectively. The chart **DEFAULT INK VALUES for &B339** shows what number are used for the various modes to hold the information on the current PEN values. The numbers may not be what you would expect, but this is because of the way that the pixels are encoded Full details are given in the Firmware Manual — page 6.4, but only if you are interested'

Let's give it a try then. Enter the following:

```
CLG 3 : ORIGIN 320,300 :
   DRAW 0,0,1
TAG : PRINT "ONE";
POKE &B339,15
TAG : PRINT "TWO";
```

This will print yellow text on a blue background at the graphics cursor. Now try:

```
DRAWR 0,0,3 : POKE &B339,
   240
TAG : PRINT "THREE";
```

This time the text is red on a yellow background. Simple, isn't it'

You could have used POKE &B338,240 and POKE &B338, 15 instead of the two DRAW commands if you so wish

Now type CLG 3 to get back to a clear RED graphics screen Try:

```
POKE &B339,100 : CLG
```

You should get a striped RED/YELLOW background. Try the value 136 instead of 100 and you will get a RED striped background. The value 235 will give you a CYAN/RED/BLUE /YELLOW striped effect. To see what other values occur try the following short program:

```
10 FOR X = 0 TO 255
20 POKE &B339,X
30 CLG : PRINT X
40 WHILE INKEY$="" :
   WEND
50 NEXT X
```

RUN the program, pressing any key to change the graphics window to the next value. Some very interesting patterns are created. For even better effects try it in MODE 0 by adding the following line to the above program:

```
$ MODE 0 : ORGIN 32,200,
   320,640,400,200
```

Note how the mixing of colours produces different shades, and in some cases some very nice Moire effects. Don't forget that different values can be poked into &B338 to create dotted and striped lines of different colours, and give some very interesting looking text!

The mixing of colours is known as stippling. I have included the program COLOUR STIPPLING for you to experiment with. This sets up three commonly used stipple patterns. You can see what the result of stippling various colours produces. All you have to do is to press keys 1 to 4 to change the various colours.

In the next article the DRAW command will be looked at in more detail and you will see how to start creating a library of commonly drawn shapes which can then be enlarged to any scale and also rotated through any angle.

```
10 SYMBOL AFTER 240:MODE 1:CALL &BC02
20 SYMBOL 240,255,0,255,0,255,0,255,0
30 SYMBOL 241,170,170,170,170,170,170,170,170
40 WINDOW #2,1,6,10,24:WINDOW #3,9,14,10,24
50 WINDOW #4,17,22,10,24:WINDOW #5,25,30,10,24
60 WINDOW #6,33,38,10,24:bord=0:back=0:fore=1
70 FOR x=2 TO 5:PAPER #x,2:PEN #x,3:CLS #x:NEXT
80 PAPER #6,3
90 DATA 241,240,207
100 FOR x=2 TO 4:READ mix
110     :FOR y=1 TO 15:PRINT #x,STRING$(6,mix);:NEXT y,x
120 PRINT "KEY 1 - Border colour  = ";
130 PRINT "KEY 2 - Background col = ";
140 PRINT "KEY 3 - Foreground col = ";
150 PRINT "KEY 4 - Pen Colour     = ";:LOCATE 1,8
160 PRINT "-MIX 1---MIX 2---MIX 3---BACK----FORE-"
170 WHILE -1
180 IF INKEY(13)<>-1 THEN GOSUB 1000
190 IF INKEY(14)<>-1 THEN GOSUB 2000
200 IF INKEY(5) <>-1 THEN GOSUB 3000
210 IF INKEY(20)<>-1 THEN GOSUB 4000
220 WEND
1000 REM*************** BORDER COLOR *********************
1010 bord=bord+1:IF bord=27 THEN bord=0
1020 BORDER bord:LOCATE 25,1:PRINT bord;:RETURN
2000 REM*************** BACKGROUND COLOR *****************
2010 back=back+1:IF back=27 THEN back=0
2020 INK 2,back:LOCATE 25,2:PRINT back;:RETURN
3000 REM**************** FOREGROUND COLOUR ***************
3010 fore=fore+1:IF fore=27 THEN fore=0
3020 INK 3,fore:CLS #6:LOCATE 25,3:PRINT fore;:RETURN
4000 REM**************** PEN COLOUR **********************
4010 pencol=pencol+1:IF pencol=27 THEN pencol=0
4020 INK 1,pencol:LOCATE 25,4:PRINT pencol;:RETURN
```

RON COMPLEX

Ron Complex, the man with no past and possibly no future discovers an even greater menace to computers — the RCWG

"Okay kid what's your name and what's your game?"

"I'm Rex Retina — hacker to the gentry. My card."

Ron peered at the muzzy oblong in his hand and the words came into focus — "Rex Retina — Eyes in Every System."

"Look kid this tells me nothing. As far as I can see a hacker's a guy with a bad cough — that's not much to build a business on "

"Where have you been? There are people who'll pay big money to gain access to classified files — that's hacking "

"I get the drift but I still can't see where the coughing comes in. Anyway what's your angle? Why do you want to help me pin the bughatchers?"

Rex shifted uncomfortably from one foot to the other. The drizzle was slowly flattening his hair into a recognisable style and water trickled down the lenses of his thick pebble glass spectacles.

"The bugs are just the beginning. The rumour on the street is that the Erratic Club are about to unleash the ultimate disruptor of computer systems, something that will put the computer industry and the hackers totally out of business."

"Let's walk, the pavement is no place for earthshattering revelations," said Ron

Ron and Rex walked off down the street, their receding figures watched by the grizzled face of Captain Counterfeit, standing in the doorway of the Meatball and Micro.

The Captain scratched his beard and his parrot broke the night air with his familiar call, "Goto the Captain. Goto the Captain. Every disc original. Every disc original. Aark. Disc drive must be dodgy Disc drive must be dodgy. Aark... Goto the "

A swift tap on the beak brought silence, "Not now Fang," said the Captain. In the corner of a greasy spoon, Ron and Rex sought sanctuary from the elements.

Ron raised a grimy rimmed mug to his lips and said, "Right kid this is the kind of place for earthshattering revelations." Ron took a sip of tea, winced, punched his chest a few times and exhaled, "Strong stuff. Come kid spill the beans."

"All right. The word is that the Erratic Club has devised an RCWG." Ron looked at the ceiling, then at the floor, and then took another look at the ceiling."

"A what?" asked Ron.

Rex, his voice tinged with impatience, said, "A random code word generator "

"A what?"

"Every system needs a code word to gain entry, right? Now what they appear to have is a device that hooks in and changes the code word every thirty seconds."

"Sounds smart to me "

"Yeah if it's true they'll be able to put every hacker out of business but the catch is that the operators won't be able to gain access either. We'll have thousands of systems that nobody will be able to get into. Complete stalemate."

Ron took a final gulp of tea and stood up, "Sounds like it's time to pay the erratic club a visit "

Ron and Rex stood on the corner of a backstreet. A huge building with no windows stood on the other side of the street. There was a single door.

"Well that's it," said Rex, "It's up to you now. Just one word of warning. They'll be watching you so don't just go up to the door and knock. Do something erratic or they'll suss you straight away.

"They want something erratic huh? Okay watch this.

Ron hopped for a couple of steps circled a lampost a couple of times, walked sideways and with a final hop, skip and a jump he was at the door.

"That should convince them," thought Ron. He knocked on the door. The hatch slid back in an instant. "Yes?" came a voice from within.

"I'm feeling erratic, I want to join the club."

"Wait there please "

The hatch slid shut. Ron looked up and down the street but saw no-one. Suddenly he felt someone tying rope round his feet. He looked down and saw two hands tying a granny knot round his ankles.

The hatch flew open and he felt a rope tighten around his neck. The hands at his feet undid the granny knot and tied a bow instead. Ron was pulled tight against the door and the door was tilting upwards slowly. Blood rushed to Ron's head and he knew that in a few seconds he would be upside down on the inside. "Hope my hat doesn't fall off" thought Ron.

Next week: Erratically speaking

BEGINNING MACHINE CODE

Time to wind up our machine code series by Terry and Diana Smith with hints and tips for future projects

This is the last article in our series on machine code for the Spectrum. We hope that the series has given you enough information to understand the inner workings of the machine code routines published in the magazine and will encourage you to have a go at developing you own. By way of wrapping up the series, we will go over some of the techniques that should make machine code programming a little easier.

Firstly, let's consider when to use machine code. The main benefits of code are the very fast execution speeds and the ability to get away from the Spectrum's BASIC operating system. Routines can generally be written in fewer bytes with code than in BASIC but this is not always the case. The block move and block search routines described in part 7 are examples of the real advantages of machine code, namely very fast, compact code.

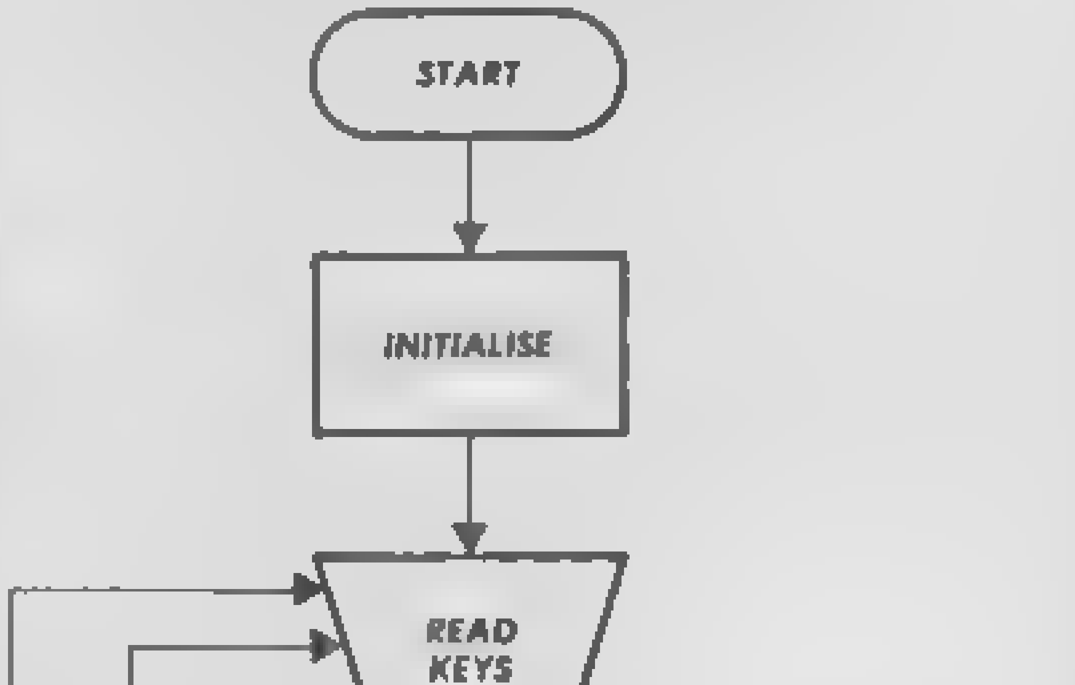


Fig 1 Flowsheet of "sketch" routine; see Part 6 Listing 1

Rectangle = process operation

Diamond = decision

Trapezoid = input or output

On the other hand, Spectrum BASIC offers an excellent program editor and is relatively easy to debug. If you have tried to make any significant changes to our examples or have had a go at writing your own routines, you will have realised that debugging machine code can be quite trying!

So, it comes down to horses for courses. For arcade-type games or routines that are really unacceptably slow in BASIC, machine code is justified. If you are writing a program with a lot, or even a little, number-crunching in it, stick to BASIC. Trying to write floating-point arithmetic routines when they already exist in ROM has got to be a pastime reserved for masochists.

One way of having your cake and eating it is to use a compiler. This is a program which reads your BASIC program and translates it into machine code for you. This is achieved by using a number of machine code routines as building blocks with which to simulate the BASIC program. They do not produce the most elegant code because they have to cope with the flexibility of the BASIC commands. On the other hand they will almost certainly save a lot of heart-ache. Many compilers are not able to handle floating-point numbers or the string functions though, so if you decide to take the short cut, make sure the compiler you buy will cover your needs.

While we are talking of buying things, if you have decided to take the plunge and try your hand at code, you would be well advised to get an assembler. Computers are very good at doing boring repetitive tasks like looking up the assembler code for mnemonics and calculating relative jumps and addresses within routines. So, be fair to your computer and give it some exercise! It will quickly repay the frustration of recalculating. jump displace ments for the umpteenth time

The other tools of the trade are books. There is now a large choice of books on Spectrum machine code, varying from the simple to the advanced. Amongst this range you ought to find one that will suit your needs. Many will give details of useful routines in the ROM, indeed one of the most useful is the ROM disassembly by Logan and O'Hara.

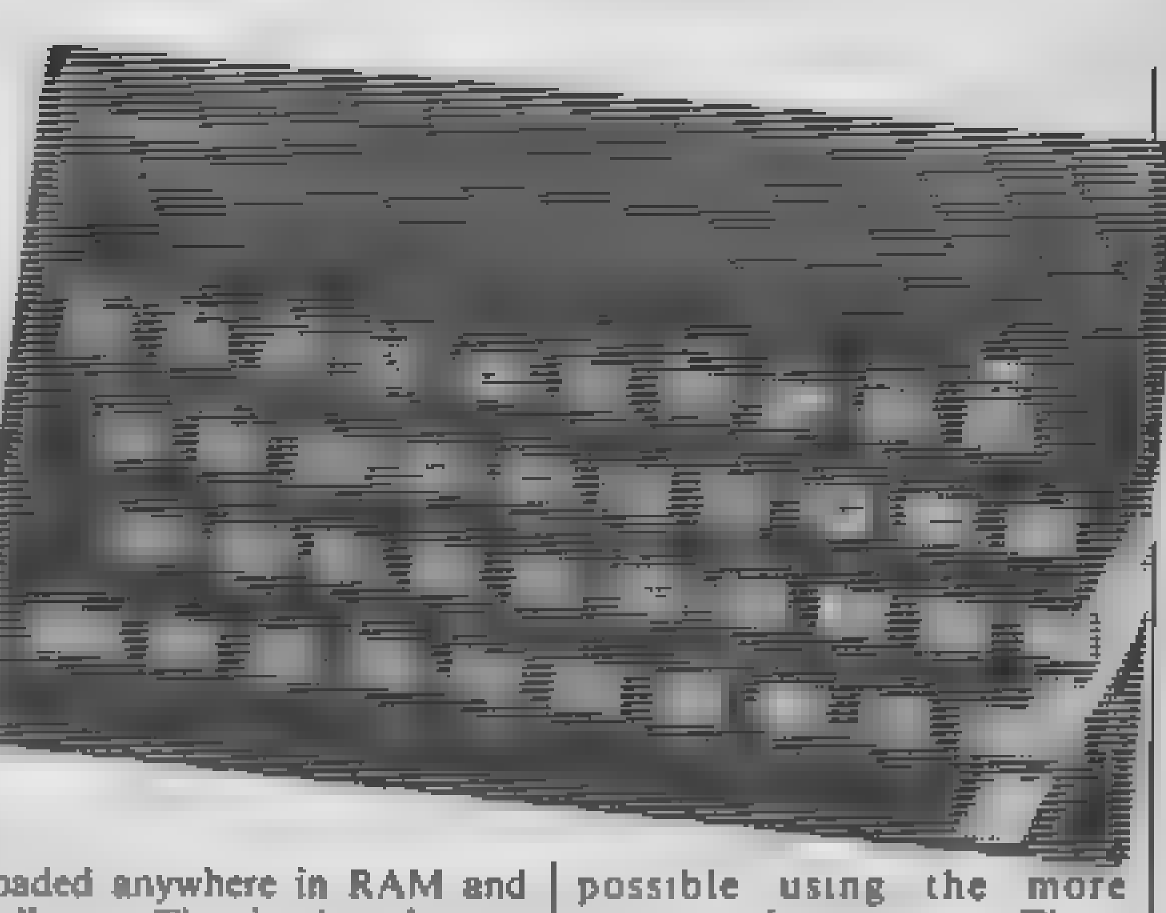
Given that your library is complete, your assembler is loaded and you are full of enthusiasm to begin entering code, what is the best way of writing a routine? Firstly, switch off the Spectrum and find pencil and paper. Then break your idea down from a general concept into smaller and smaller sections.

Be clear about what each routine and sub-routine is meant to do. Get into the habit of writing plenty of notes about your routines, especially any input the routine requires in order to run and the output it produces. It may seem to be a trial at the time but will prove worthwhile when you come back to use the routine in another program months later

One common method used to develop all computer programs is the flowchart. Figure 1 shows the initial flowchart used to write the keyboard reading routine given as Listing 1 in part 6 of this series. If you refer back to that listing, you will see that the "Calculate valid plot position" box was vastly expanded to produce a working routine.

You may also find it helpful to write your routines in BASIC first and then translate them into code. Again, this may not produce the most elegant code but if it works, why worry?

There is an advantage in writing relocatable code for routines that you may use in a number of programs. The term relocatable means that the machine code routines can be loaded anywhere in RAM and will run. This implies that no direct jumps or addresses are used



So, we come to the end. The intention of the series has been to introduce Spectrum Z80 machine code to beginners and to show, by a number of short but useful routines, what is possible using the more common instructions. Those who have been bitten by the coding "bug" can now get one of the available books and learn about the alternate registers, the interrupts which allow the Spectrum to appear to do two things at once, etc., etc. Happy coding

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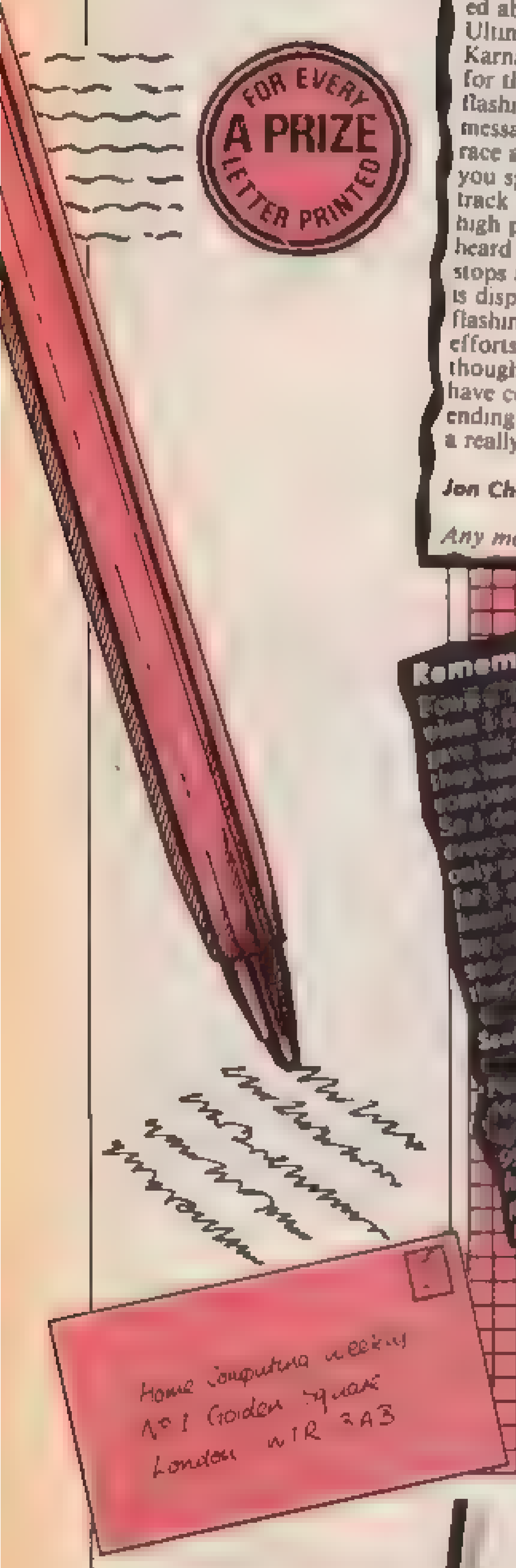


Dead ends

Having recently completed Mastertronics Action Biker I was appalled at the ending. Some people have complained about the ending of Ultimates "Staff of Karnath" where all they saw for their efforts was a flashing border and a small message. The so-called drag race at the end consists of you speeding along the drag track to the finish line, a high pitched note can be heard and the game abruptly stops and the title screen is displayed, not even a flashing border for my efforts. I would have thought Mastertronic could have come up with a better ending that otherwise spoils a really good game.

Jon Chatten, Norwich

Any more?

Moans and Groans

[illegible]

Martin Wong, Chesterfield

Remember Texas

[illegible]

Scott Moore, Belfast

[illegible]

Price war on pirates

I am writing to make known my ideas on solving the growing software piracy problem. The problem is that it is not possible to protect any program from a determined person with a good knowledge of machine language, programming and electronics

Software piracy is a major contributor to the cost of software. The manufacturers will charge a ridiculously high price for software which they know will be used to produce many copies. So it is the consumer and not just the industry who is paying for piracy

The obvious solution is to lower the cost of software and make it less worthwhile for people to copy it. For the majority of single program cassettes an ideal price would be between £2 and £4

Some software houses have cut prices but that is not enough, everyone needs to do so. When all the software manufacturers realise this, software piracy will decrease rapidly — though of course it can never completely cease.

Micheal Groll, Rugeley, Staffs

We would like to point out that HCW doesn't agree with all the views expressed above but free speech is perfectly allowable

Coming to a bad end

[illegible]

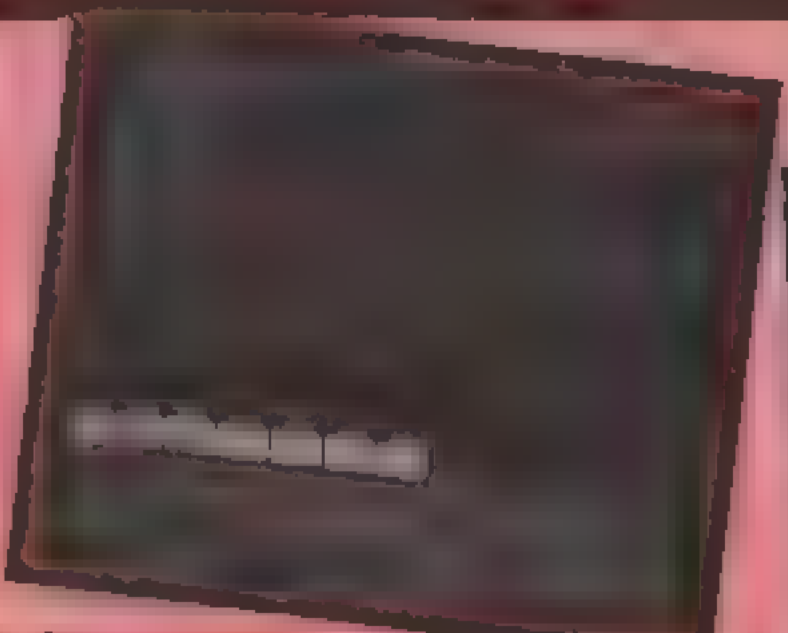
W G Barker, Washington, Tyne and Wear

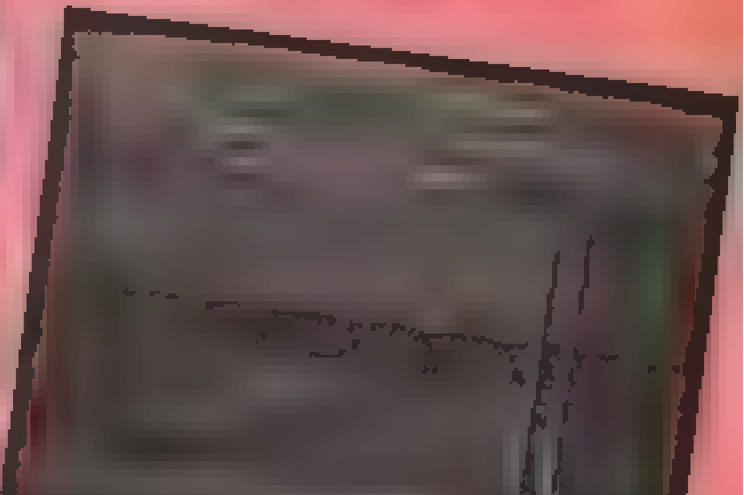
[illegible]

LETTERS PAGE

U.S. GOLD

All American Software





SUMMER GAMES

[illegible]

This weeks prize will take even the most dedicated sports fanatics to the limits of their endurance — not just Summer Games but also Summer Games II. That's 16 gold medal events from U.S [illegible]

Summer Games is an all action package featuring pole vault, 100m sprint, 400 metres relay, gymnastics, skeet shooting and for the aquatically inclined, freestyle relay and 100m freestyle

The sequel, Summer Games II comprises eight brand new events — triple jump, rowing, javelin, high jump, fencing, cycling, kayaking and an equestrian competition — it's exhausting just listing them

Twenty five double prizes of Summer Games I and II worth £750 in all, are on offer to C64 owners on either tape or disc

As well as high definition graphics the games both feature opening and closing ceremonies and an award ceremony with national anthems You can even choose which country you want to represent The games are joystick controlled and can be played by up to eight players or you can compete against the computer

If you want to find yourself on the winners rostrum, answer the five questions below that test your knowledge of athletic and Olympic achievements

1. Who won the gold medal in the women's javelin at the 1984 Olympic games?

2. David Hemery won a gold medal in the 400m hurdles at the Olympics. What year?

3. How many Golds did swimmer Mark Spitz win in the 1972 Olympics?

4. Which British athlete recently broke three different world records in 19 days?

5. How many gold medals were won by sprinter Carl Lewis in the 1984 Olympic Games?

How to enter

Answer the five questions clearly on the entry coupon and post to Summer Games Competition, Home Computing Weekly, No.1 Golden Square, London W1R 3AB to arrive by first post on Friday 6 September. Remember to state whether you require tape or disc

The rules

- Entries will not be accepted from employees of US Gold, Argus Specialist Publications and Alabaster Passmore & Sons, their agents or distributors
- The How to enter section forms part of the rules
- The editor's decision is final and no correspondence can be entered into

Summer Games Competition

Entry Coupon

Name ____________________

Address ____________________

____

____________________ **post code** ____________________

Please make my prize: tape / disc

Answers

1 ____________________

2 ____________________

3 ____________________

4 ____________________

5 ____________________

Complete clearly and fully — if you are a winner this will act as a label for your prize. Post to Summer Games Competition, Home Computing Weekly, No I Golden Square, London W1R 3AB. Closing date first post Friday 6 September, 1985

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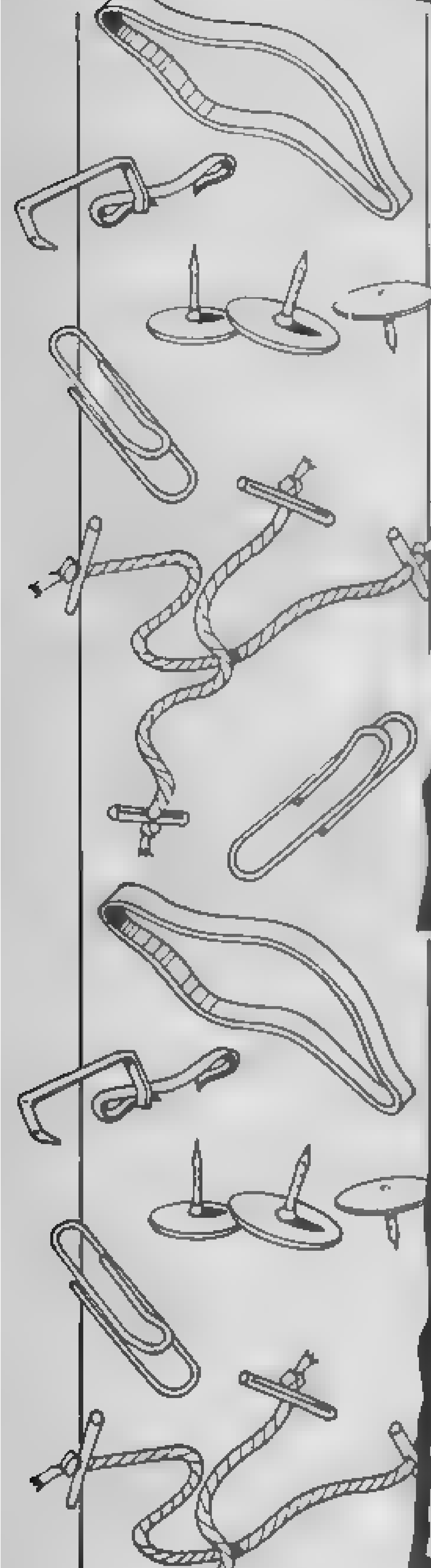
READERS PAGE

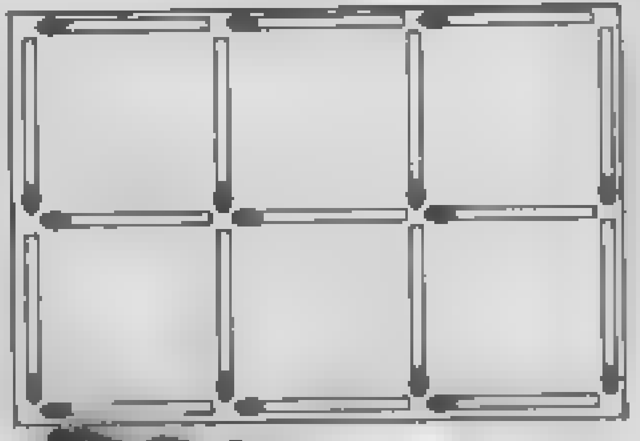
Readers hi-score table

Name	Game	Machine	Score
Tim Simcox	Hyper Sports	Spectrum	100,033
Andy Clarke	Raid Over Moscow	C64	333,200
	Bruce Lee	C64	1,055,675
	Pole Position	C64	120,370
	Beamrider	C64	57,354
	Hercules	C64	223,540

Got it pegged?

Douglas Anderson writes to say he has solved the Victorian Peg puzzle in HCW [illegible] for the BBC and Electron [illegible] world record. The program [illegible] Trevor [illegible] will give [illegible] Watch this space





Solution to last week's puzzle

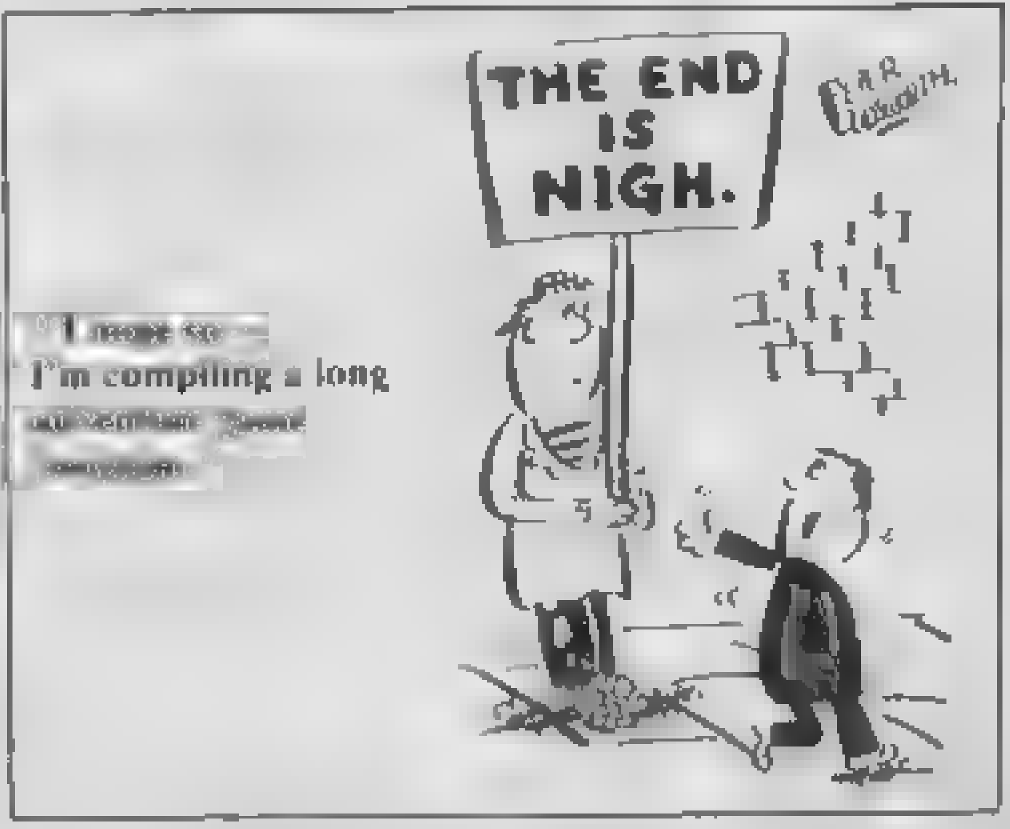
Matchtricks

Here is a polite suggestion as to what you can do with all those matches you don't need, having never started [illegible] Lay them out as [illegible]

A Take [illegible] matches away in order to [illegible] squares.

B Put them back [illegible] start and [illegible] create [illegible] squares [illegible] made [illegible] same size as the [illegible]

P.S. why not program your machine to let you draw these designs and then rub out [illegible] them.


THE END IS NIGH.

"I hope so — I'm compiling a long [illegible]"

Hints and tips

A tip for BBC users from J C Deighton of Nottingham "If you don't want people to look at your programs put this line into your program *FX200,3 This disables the escape key and when break is pressed it totally clears everything in the memory."

Some useful pokes for the Atari 800XL from Andrew Itejka of Glasgow 5 POKE 2,52 POKE 3,185 POKE 9,2 TRAP 10000 10 GRAPHICS 18: POSITION 1,5:? 6," PRESS SYSTEM RESET"
15 GOTO 15
10000 RUN

Andrew adds, "To disable Atari's system reset put line 5 at the start of your programme and 10000 at the end

Kindness to computers

Shaun Ruddock from Bath, who went through the traumatic experience of seeing his home computer, "die suddenly at his fingertips after a short illness" has come up with his do's and don'ts for computer care which he terms as his "short idiot proof guide to computer preservation to prevent further micros going to that giant silicon graveyard in the sky."

If you've found ways of prolonging the active life of your micro, why not drop a line to HCW Here are Shaun's computer life savers

- Always use a dustcover when your computer is not in use and never try to vacuum clean the keyboard as extensive damage may be caused — it's a lot less bovver with a cover!
- Ensure that the computer is used on a steady and secure surface and has a firm footing.
- Avoid trailing leads and never overload electric sockets
- Never rest fluids, (tea, coffee etc.) near your micro if spillage is possible.
- Never attempt to do your own micro-surgery, to coin a phrase, always consult an expert and have it repaired by a professional.
- Always ask repair companies and request a receipt Try to avoid that bloke round the corner who'll try to fix it for a tenner
- Avoid leaving your computer alone defenceless with young children or mischievous pets
- Do not use your micro for excessively long periods as overheating can be harmful
- Ask for a lengthy demonstration if you wish to buy a second hand micro and look it over carefully.
- Get your computer serviced regularly and lastly never take out your anger on your computer even if it continues to thrash you at everything.

ATARI ST

520ST

POWER WITHOUT THE PRICE

THE NEW ATARI 520ST

Under the new leadership of Jack Tramiel (former boss and founder of Commodore Business Machines), Atari Corporation have marked their entry into the world of business/personal computers with a machine which leaves the competition standing. Tramiel's slogan 'Power Without the Price' has been implemented in the manufacture of the new 512K Atari 520ST colour computer which offers the user amazingly high performance at an incredibly low price. Launched as a work-station, this new system incorporates seven software packages as well as the 520ST computer with 512K RAM, mouse controller, high resolution monochrome monitor (640x400), 95 key keyboard (with 18 key numeric keypad), MIDI interface, GEM and a 500K 3½ inch disk drive, all for the package price of only £651.30 (+VAT = £749). Dubbed the 'Mac beater' and the 'Jackintosh' (after Atari's Chief, Jack Tramiel), Atari's new machine has been directly compared with the Apple Macintosh RRP £2595 (+VAT = £2985) which offers similar features and capabilities but at a much higher price. Favourably reviewed by the UK's highly critical specialist computer press, the 520ST is likely to make a great impact in this country as a sophisticated alternative to an IBM PC, APRICOT or APPLE MACINTOSH. Unlike its overpriced competitors, the Atari 520ST can be linked up to a colour monitor to unleash a choice of up to 512 colours. The addition of colour brings out the full potential of graphics packages such as GEM.

USER FRIENDLY GEM OPERATING SYSTEM

The power of the ST is harnessed and made user friendly by the new operating system 'GEM' from Digital Research. GEM stands for Graphics Environment Manager and allows a user friendly colour or B/W graphics interface which closely resembles that of the Macintosh. This similarity extends to the use of moveable resizeable windows, icons to represent objects such as disks and disk drives, and the use of pull down menus and a mouse. The advantage of all this is that the computer becomes extremely easy to use. GEM has now been implemented for the Acorn, ACT, Atari, IBM, ICL, and Olivetti. Software written for GEM on one computer should also run under GEM on another computer. This will enable the market to quickly produce a large library of standard interchangeable software.

FREE SOFTWARE AND FUTURE EXPANSION

The Atari 520ST comes supplied with seven free software packages as listed below: 1) TOS - Tramiel Operating System based on CPM 68K. 2) GEM Graphics Environment Manager by Digital Research (DR) giving a WIMP (Window, Icon, Mouse, Pull down menu) environment. 3) DR GEM Paint for creating graphics masterpieces. 4) DR GEM Write for word processing. 5) Logo learning language to enable you to write your own programs easily using turtle graphics. 6) DR Personal Basic a powerful user friendly version of the Basic programming language. 7) BOS operating system giving you access to dozens of business applications packages already available on the market. Designed with future expansion in mind, the ST also features a host of different interfaces to the outside world and an impressive list of accessories is planned. Atari will soon be releasing a 1000K (1MB) 3½ inch disk drive, and a 15MB hard disk storage system as well as a mass storage compact disk (CD) player capable of storing an entire 20 volume encyclopaedia on one disk. A full range of inexpensive printers are planned including dot matrix, daisywheel and thermal colour printers. With its unbeatable graphics, speed and software at a price which is far below that of any comparable personal computer currently on the market, the ST is all set to do battle with the competition. To receive further details of the ST from Silica Shop, just fill in the coupon below with your name and address details and post it to us.

Silica Shop Price: £651.30 + £97.70 VAT = £749.00 This price includes:

- ★ ***512K RAM***
- ★ ***MOUSE***
- ★ ***GEM***
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- ★ ***500K 3.5" DISK DRIVE***
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£749

ATARI 520ST SPECIFICATION

MEMORY
512K RAM (524,288 bytes)
16K ROM expandable to 320K
Port for addnl 128K plug-in ROM cartridges
200K TOS operating system

GRAPHICS
Individually addressable 32K bit-mapped screen with 3 screen graphics modes:
320x200 pixels in 16 colours (low resolution)
640x200 pixels in 4 colours (med resolution)
640x400 pixels in monochrome (high res)
16 shades of grey in low res mode
512 colours available in low/medium res
8 levels of each in red, green and blue

ARCHITECTURE
4 custom designed chips:
GLUE Chip - MMU Memory Mngmnt Unit
DMA Controller - Graphics Processing Unit
16/32 bit Motorola 68000 processor at 8MHz
eight 32 bit data registers
eight 32 bit address registers
16 bit data bus/24 bit address bus
7 levels of interrupts/56 instructions
14 addressing modes/5 data types

DATA STORAGE
High speed hard disk interface
Direct memory access 1.33 Mbytes per second
CD (Compact Disc) interface
Built in cartridge access
Dedicated floppy disk controller

DISK DRIVE
500K (unformatted) 3½" floppy disk drive
349K (formatted) storage capacity

SOUND AND MUSIC
Sound Generator
Frequency control from 30Hz to above audible
3 voices (channels) in wave shaping sound in addition to a noise generator
Separate frequency and volume controls
Dynamic envelope controls
ADSR (Attack, Decay, Sustain, Release)
Noise generator
MIDI interface for external music synthesisers

KEYBOARD
Separate keyboard microprocessor
Standard QWERTY typewriter styling
Ergonomic angle and height
95 keys including 10 function keys
Numeric keypad — 18 keys including ENTER
One touch cursor control keypad

MONITOR
12" screen - high res monochrome monitor
640x400 monochrome resolution

VIDEO PORTS
Colour - Low Resolution - 40 columns
Med/High Res - 80 columns
Medium res RGB (Red/Green/Blue) output
High resolution monochrome (Black & White)

COMMUNICATIONS
Bidirectional centronics parallel interface for printers or modems capable of input/output
RS232C serial modem/printer interface
VT52 Terminal Emulation Software
Maximum Baud Rate up to 19,200
High speed hard disk interface
Floppy disk controller (Western Digital)
2 joystick ports (one for 2 button mouse)
MIDI interface for external music synthesisers

GEM WIMP ENVIRONMENT
WIMP - Window Icon Mouse Pop-down menus
Two button mouse controller
Icons/Pull down menus/Windows
GEM VDI - Virtual Device Interface
GEM AES - Application Environment Services
GEM BBT - Bit Block Transfer
Real time clock & calendar

SOFTWARE
GEM environment
with user friendly Macintosh style operation
TOS - Tramiel Operating System
Atari's own system based on CP/M 68K with hierarchical directory & file structure plus a host of MS DOS & UNIX command structures
BOS - Business Operating System
to run any standard BOS business programs
GEM desktop
with GEM PAINT graphics paint system and GEM WRITE word processor
Personal BASIC and DR Logo
originally written by Digital Research (DR)
very much the same as other machines except for the extensive use of pull down menus, mouse control and windows

VARIOUS
Dimensions: 470mmx240mmx60mm
Replaceable external power supply
Expansion: 3½" floppy disk drives 500K/1 MBYT (two drives can be connected)
3½" 15MB hard disk
CD (compact disc) player
Dot matrix & daisywheel printer (ppm)
Thermal dot matrix (colour)
RGB & monochrome monitors

LANGUAGES
BASIC & LOGO supplied
Many others are soon to be available, including Assembler, BCPL, C, Cobol, Compiled Basic, Lisp, Modula-2 and Pascal

Note: Some of the above specifications are pre-release and may therefore be subject to change

MACINTOSH v F1e v 520ST

"Imagine a Fat Mac - the 512K Apple Macintosh - but with a bigger screen, a far bigger keyboard with numeric keypad, cursor and function keys, and colour. That gives you some idea of what the Atari 520ST is like, except for two important things. First the Atari seems faster. Second the Atari system is about one third of the price."
June 1985 - Jack Schofield - **PRACTICAL COMPUTING**

	APPLE	APRICOT	ATARI
FEATURES OF BASIC SYSTEM	**MACINTOSH**	**F1e**	**520ST**
Price includes B/W Monitor	YES	NO - extra £200	YES
Keyboard size mm (LxDxH)	330x147x50	450x187x35	470x240x60
Keyboard size ins (LxDxH)	13x5¾x2	17¾x6¾x1	18½x9½x2⅓
3½" D/Drive (Unformatted)	500K	500K	500K
3½" D/Drive (Formatted)	399K	315K	349K
WIMP (Window, Icon, Mouse...)	Apple	ACT - Activity	GEM
Real Time Clock	YES	YES	YES
Polyphonic Sound Generator	YES	NO	YES
RS232 Serial Port	YES	YES	YES
Centronics Parallel Printer Port	NO	YES	YES
Dedicated Floppy Disk Controller	NO	YES	YES
Hard Disk DMA Interface	NO	YES	YES
Full stroke keyboard	YES	YES	YES
Number of keys on keyboard	58	92	95
Numeric Keypad	NO	YES (16 Keys)	YES (18 keys)
Cursor Control Keypad	NO	YES	YES
Function keys	NO	10	10
16-bit processor	68000	Intel 8086	68000
Processor running speed	8MHz	4.77MHz	8MHz
RAM size	512K	256K	512K
Number of graphics modes	1	4	3
Number of colours	Monochrome	16	512
Max Screen Resolution (pixels)	512 x 342	640 x 256	640 x 400
Mouse included	Single Button	NO - extra £95	Two Button
Replaceable External Power Pack	NO	NO	YES
Cartridge Socket	NO	NO	YES
Joystick Ports	NO	NO	YES (two)
MIDI Synthesiser Interface	NO	NO	YES
Monitor Size	9"	9" - extra £200	12"
RGB Video Output	NO	YES	YES

System Cost with: Mouse - Monochrome Monitor - 512K RAM - 500K Disk Drive

Price of basic system (exc VAT)	£2595+VAT	£595+VAT	£651+VAT
+ Mouse	Included	£95+VAT	Included
+ Monochrome Monitor	Included	£200+VAT	Included
+ Expansion to 512K RAM	Included	£295+VAT	Included
Price of complete system (exc VAT)	£2595+VAT	£1185+VAT	£651+VAT
PRICE rounded down including VAT	**£2,984**	**£1,362**	**£749**

PRESS COMMENT

"Atari's new corporate image as an aggressive low cost computer maker is likely to mirror that of Commodore where Mr Tramiel established the maxim that 'Business is war'."
August 21st 1984 **FINANCIAL TIMES**

"This is the only personal computer I know of that comes with a MIDI interface as standard."
Peter Bright March 1985 **PERSONAL COMPUTER WORLD**

"The (GEM) version running on the Atari 68000 machines will have the additional advantage of leaving the PC version standing."
April 6th 1985 **PERSONAL COMPUTER NEWS**

"It would seem that GEM offers the ideal operating system."
March 7th 1985 **POPULAR COMPUTING WEEKLY**

"I found it (GEM) extremely easy to use and was very impressed with the way in which it disguises the unfriendly hardware and operating systems lurking under the surface."
Peter Bright Feb 1985 **PERSONAL COMPUTER WORLD**

"The electronics in the machine are a work of art ... The heart of the 520ST is a Motorola 68000, one of the most powerful 16-bit processors around and in many respects it is closer to being a 32-bit chip ... when the machine appears in the shops, I'll be at the front end of the queue to buy one."
Peter Bright June 1985 **PERSONAL COMPUTER WORLD**

"This machine is significantly more powerful than an IBM PC ... If it's possible to design a sure-fire winning machine, this is it."
May 11th 1985 **PERSONAL COMPUTER NEWS**

"... the use of GEM makes the new range of Atari computers so similar to the Macintosh (with the added attraction of colour), that they are already being called 'Jackintoshes'."
May 2nd 1985 **COMPUTING**

"The new Atari ST computers truly represent to the consumer what Jack Tramiel is saying — easy-to-use computing power without the price."
March 1985 **ANALOG COMPUTING**

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May 23rd 1985 **POPULAR COMPUTING WEEKLY**

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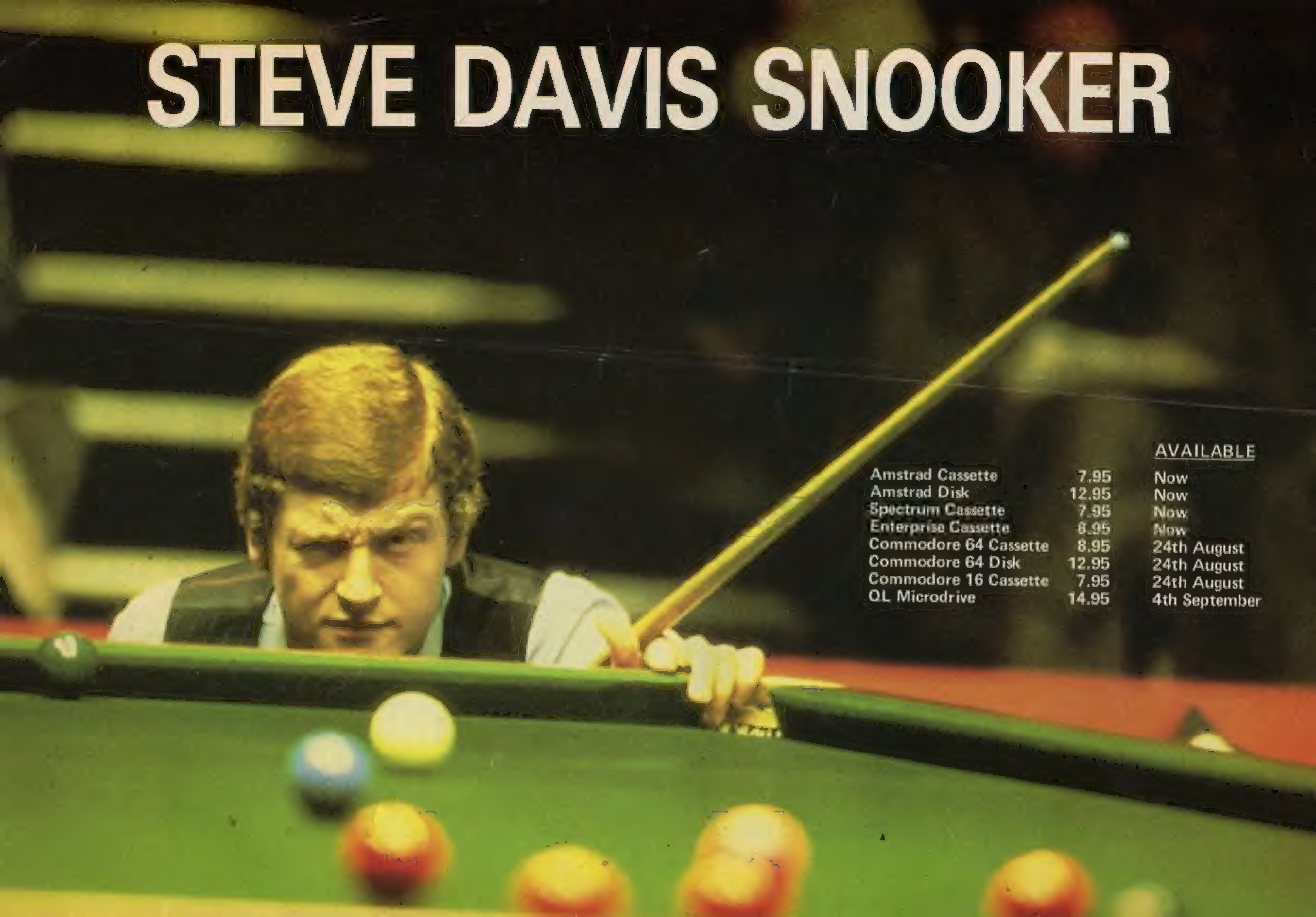

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